

# Carleton University

1969 | 1970



Faculty of Arts

Faculty of Science

Faculty of Engineering

Faculty of Graduate Studies

School of Commerce

School of Journalism

School of Public Administration

The Institute of Canadian Studies

School of International Affairs

School of Architecture

*As this Calendar is published several weeks before the opening of the session, the University reserves the right to make whatever changes circumstances may require, including cancellation of particular courses.*



Main Court, Rideau River Campus

## **Carleton University**

Twenty-eighth Annual Calendar for  
the academic year 1969-70

Rideau River Campus  
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Ottawa 1  
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# The Academic Year

## *Summer Session 1969*

To be announced	Graduate student registration for summer term.
May 19	Statutory Holiday. University closed.
May 21, 22	Registration for Summer Evening Session, 2-4 p.m., 7-9 p.m.
May 26	Summer evening classes begin.
June 20	Last day for change from one course to another in Evening Division of Summer School.
July 1	Statutory Holiday. University closed. Evening classes meet instead on the following Friday.
July 2	Registration for Summer Day Session, 9 a.m. - 12 noon, 2-4 p.m.
July 3	Summer day classes begin.
July 11	Last day for change from one course to another in Day Division of Summer School.
July 25	Last day for formal withdrawal from Summer School.
August 4	Civic Holiday. University closed. Evening classes will meet instead on the following Friday.
August 15	Last day for Summer School classes.
August 23	Supplemental and special examinations end. Summer School examinations end.

## *Winter Session*

July 4	Last day for applications for admission from mature matriculants.
	Last day for applications for admission from candidates whose documents originate outside Canada.
	Last day for application for supplemental and special examinations.
August 1	Last day for applications for admission from candidates transferring from other universities.
August 15	Last day for applications for admission except in the Faculty of Graduate Studies (see also July 4).
September 1	Statutory Holiday. University closed.
September 3	Last day for receiving applications for degrees from potential fall graduates.
September 5	General Faculty Board meeting.
September 8-12	Registration (including orientation) for Winter Session.
September 8-10	New students registration and orientation.
September 10-11	Graduate students (full and part-time) registration, 2-4 p.m., 7-9 p.m.
September 11-12	Returning students registration.
September 15	Classes begin in all courses, day and evening.
	Last day for submission of theses in the Faculty of Graduate Studies.
September 19	Last day for applications for Summer School supplemental examinations.
October 3	Last day for late registration. Last day for course changes.



October 13	Statutory Holiday. University closed.
October 18	Summer School supplemental and special examinations end.
October 31	Last day for formal withdrawal from first term half courses.
November 7	Fall Convocation for the conferring of degrees.
November 11	Remembrance Day. Morning classes cancelled for one hour.
December 12	Last day of day and evening classes for first term.
December 23	Mid-year examinations, including half-course finals, end.

### *1970*

January 5	Second term begins; first day of day and evening classes.
January 30	Last day for receiving applications for degrees from potential spring graduates.
February 2	Last day for applications for supplemental and special examinations in half-course finals.
February 14	Last day for formal withdrawal from courses.
February 23-28	Study period.
February 27	Half-course supplemental and special examinations end.
March 27, 28, 29	Easter weekend. University closed.
April 10	Last day of day and evening classes in second term.
April 14	Last day for submission of theses in the Faculty of Graduate Studies.
April 17	Last day for handing in term assignments subject to any earlier course deadline.
May 2	Final examinations end.

### *Summer Session 1970*

To be announced	Graduate student registration for summer term.
May 20, 21	Registration for Summer Evening Session, 2-4 p.m., 7-9 p.m.
May 22	Spring Convocation for the conferring of degrees.
May 25	Summer evening classes begin.

# Calendar of Milestones

## *The Institution*

- 1942 Ottawa Association for the Advancement of Learning established to develop Carleton College. At first the College offered only evening classes in introductory university subjects, with some courses in Public Administration.
- 1943 Ottawa Association for the Advancement of Learning incorporated.
- 1945 Beginning of day classes and full-time teaching. Establishment of the Faculty of Arts and Science, including courses in Journalism, and first year Engineering.
- 1946 Move from rented premises to the First Avenue campus, formerly Ottawa Ladies' College. First degrees awarded in Journalism and Public Administration.
- 1947 The College committed itself to complete pass and honours courses, the third year of the program being offered for the first time in 1947-48, the fourth year in 1948-49, and the fifth (honours) year in 1949-50.
- 1949 First degrees in Arts, Science, and Commerce awarded. Formation of Senate.
- 1950 First honours degrees in Arts and Science awarded.
- 1952 The Carleton College Act 1952 passed by the Ontario Legislature. This changed the corporate name to Carleton College. It also confirmed the power to grant degrees.
- 1952-53 Property for new campus acquired.
- 1953 Establishment of the School of Public Administration.
- 1954 Appointment of Architectural Associates for Carleton to prepare first master plan and to design first group of buildings.  
First honorary degree of LL.D. conferred on Dag Hammarskjöld, Secretary-General of the United Nations.
- 1955 First Master's degree awarded.
- 1957 The Carleton University Act, 1957.  
Establishment of the School of Engineering.  
Establishment of the Institute of Canadian Studies.
- 1959 Move to Rideau River campus, following construction of the Henry Marshall Tory Building (science), the Maxwell MacOdrum Library, and the Norman Paterson Hall (arts).

1961	First degrees in Engineering awarded. First Ph.D. degree awarded.
1962	Southam Hall, the University Commons, Renfrew House (women's residence) and Lanark House (men's residence) completed. Paterson Hall extended and University Union opened.
1963	Reorganization into Faculties of Arts, Engineering, Science, and Graduate Studies. Three-storey extension to MacOdrum Library completed.
1964	The C. J. Mackenzie Building (engineering) completed.
1965	The E. W. R. Steacie Building (chemistry) completed. Grenville House and Russell House (men's residences) completed. Maintenance Building and Heating Plant completed.
1966	The Physics Building completed. First extension to the C. J. Mackenzie Building completed. Two-storey extension to Southam Hall completed. Establishment of the School of International Affairs. Establishment of the School of Commerce.
1967	Loeb Building (social sciences) completed. Integration of St. Patrick's College as a division of the Faculty of Arts, and of the School of Social Work on the St. Patrick's campus.
1968	Establishment of the School of Architecture. Second extension to the C. J. Mackenzie Building completed.
1969	Controlled Environmental Facility completed. Third extension to the C. J. Mackenzie Building completed. Addition to the Heating Plant completed. Addition to the University Union (gymnasium) completed.

#### *Presidents*

1942-1947	Henry Marshall Tory.
1947-1955	Murdoch Maxwell MacOdrum.
1955-1956	James Alexander Gibson (acting).
1956-1958	Claude Thomas Bissell.
1958-	Arnold Davidson Dunton.

#### *Chancellors*

1952-54	Harry Stevenson Southam.
1954-1968	Chalmers Jack Mackenzie.
1969-	Lester Bowles Pearson.

#### *Enrolment*

In the winter session 1968-69 there were 5,971 full-time students registered at the University: 5,042 on the Rideau River campus, and 929 on the St. Patrick's campus. There were 4,035 part-time students taking degree credit courses on the two campuses.

**Chancellor**

Lester Bowles Pearson, P.C., C.C., O.B.E., M.A., LL.D.,  
D.C.L., F.R.A.I.C.

**President  
and Vice-Chancellor**

Davidson Dunton, LL.D., D.SC.

**Board of Governors**

Chairman  
D. A. Golden, LL.B.

Treasurer  
Victor S. Castledine, Esq.

Members Ex-Officio  
The Chancellor  
The President and Vice-Chancellor

**Elective Members***Retire 1969*

C. H. Everett, Esq.  
Mrs. E. D. Fulton, B.A., B.S.W.  
Robin Findlay, Esq.  
Muni Frumhart, B.A., A.M.  
Charles L. Jeffrey, B.SC.  
A. B. R. Lawrence, M.P.P., M.C., Q.C.  
Grace E. Maynard, M.A., PH.D.  
H. L. Willis, B.A., M.ED., ED.D., F.C.C.T.  
William Teron, Esq.  
Mrs. A. H. Zimmerman, B.SC.

*Retire 1970*

A. Andras, Esq.  
G. E. Beament, O.B.E., E.D., Q.C.  
V. S. Castledine, Esq.  
D. M. Coolican, B.ENG., B.SC.  
C. Fraser Elliott, C.M.G., Q.C.  
F. E. Gibson, B.COM.  
J. Lorne Gray, D.SC., LL.D.  
Bertram Loeb, M.A.  
M. W. Mackenzie, C.M.G., B.COM., C.A.  
T. R. Montgomery, Esq.

*Retire 1971*

John C. Clarke, B.A., LL.B.  
D. F. Duclos, B.COM.  
C. F. Elderkin, B.COM., C.A.  
D. A. Golden, LL.B.  
A. M. Laidlaw, B.SC., Q.C.  
H. A. MacDougall, O.M.I., B.A., PH.D.  
Ernst M. Oppenheimer, B.A., M.A., PH.D.  
L. Rasminsky, C.C., C.B.E., B.A., LL.D., D.H.L., D.C.L.  
R. G. Robertson, M.A., LL.D.  
F. K. Venables, B.A.

*Secretary*

Donald C. McEown, B.A., DIP.BUS.ADMIN.

# Senate of the University

## Ex-Officio Members

Professor Swithun Bowers, B.A., M.SC., LL.D.  
President Davidson Dunton, LL.D., D.SC.  
Dean D. A. George, B.ENG., M.S., SC.D.  
Mr. F. E. Gibson, B.COM., LL.B.  
Dean J. J. Kelly, O.M.I., M.A., D. de l'U.  
Associate Dean G. C. Merrill, M.A., PH.D.  
Dean H. H. J. Nesbitt, M.A., PH.D., D.SC., F.L.S.  
Chancellor L. B. Pearson, P.C., C.C., O.B.E., M.A., LL.D.,  
D.C.L., F.R.A.I.C.  
Associate Professor A. T. Tolley, B.A.  
Dr. H. L. Willis, B.A., M.ED., ED.D., F.C.C.T.  
Dean of Graduate Studies

## Elected Members

Professor C. H. Amberg, M.A., PH.D., F.C.I.C.  
Associate Professor D. M. Anderson, B.S.A., M.SC.  
Assistant Professor D. K. Bernhardt, B.A., M.A.  
Associate Professor G. W. Bigg, B.SC., M.SC., PH.D.  
Associate Professor F. W. Black, B.SC. (M.E.), M.A.S.C.  
Professor L. A. Cormican, O.M.I., B.A., M.A., S.T.L.  
Professor G. S. Couse, B.A., PH.D.  
Mr. Ron Dilabio  
Associate Professor James Downey, B.ED., M.A., PH.D.  
Professor H. E. English, B.A., PH.D.  
Mr. Robin Findlay  
Professor Muni Frumhartz, B.A., A.M.  
Associate Professor W. I. Gillespie, B.A., PH.D.  
Professor E. P. Hincks, M.A., F.R.S.C.  
Associate Professor B. W. Jones, B.A., A.M., PH.D.  
Associate Professor C. H. Langford, A.B., PH.D.  
Associate Professor H. A. MacDougall, O.M.I., B.A., PH.D.  
Associate Professor P. C. Merkley, M.A., PH.D.  
Professor H. B. Neatby, B.A., M.A., PH.D.  
Associate Professor J. T. O'Manique, O.M.I., B.PH.,  
PH.L., PH.D.  
Professor E. M. Oppenheimer, B.A., M.A., PH.D.  
Associate Professor G. Paquet, M.A.  
Professor D. C. Rowat, B.A., A.M., PH.D.  
Associate Professor T. J. Scanlon, B.J., D.P.A., M.A.  
Professor George Setterfield, B.A., PH.D.  
Professor D. Shadbolt, B.ARCH., F.R.A.I.C.  
Professor D. W. Sida, M.SC., PH.D., F.R.A.S.  
Professor J. S. Tassie, B.A., M.A., PH.D.  
Assistant Professor A. Tilson, M.A., B.LITT.



Associate Professor Nicole Vanier, B.Sc., M.S.S.  
Mr. Victor A. Wehrle  
Professor J. C. S. Wernham, M.A., S.T.M.  
Mr. David Wolfe  
Associate Professor D. J. Wurtele, B.A., M.A., PH.D.  
Associate Professor R. W. Yole, B.Sc., M.A., PH.D.

### **Special Appointments**

Mr. Bruce Brittain  
Mr. Norman D. Fenn, B.S., M.ED.  
Miss Hilda G. Gifford, B.A., B.L.S.  
Mr. Walter B. Herbert, B.A., LL.B.  
Mr. J. I. Jackson, D.F.C., B.A., M.F.A.  
Professor G. R. Love, M.A., PH.D.  
Mr. Ian Reesor  
Mr. F. Turner, B.COM., M.A., F.C.I.S.  
Dean V. F. Valentine, M.A.

### **Officers of Administration**

*President and Vice-Chancellor,*  
Davidson Dunton, LL.D. Saskatchewan, Queen's, British  
Columbia, Toronto, D.Sc. Laval  
*Dean of the Faculty of Arts*  
G. C. Merrill, M.A. McGill, PH.D. California  
*Associate Dean, Division I of the Faculty of Arts,*  
A. Trevor Tolley, B.A. Oxford  
*Dean, St. Patrick's College division of the Faculty of  
Arts,*  
John J. Kelly, O.M.I., M.A. Toronto, D. de l'U. Paris  
*Director of the School of Commerce,*  
T. N. Brewis, M.COM., PH.D. Durham  
*Director of the Institute of Canadian Studies,*  
Pauline Jewett, M.A. Queen's, PH.D. Harvard  
*Director of the School of Journalism,*  
T. Joseph Scanlon, B.J., D.P.A. Carleton, M.A. Queen's  
*Director of the School of Public Administration,*  
R. O. MacFarlane, M.A. Queen's, PH.D. Harvard  
*Dean of the Faculty of Science,*  
H. H. J. Nesbitt, B.A. Queen's, M.A., PH.D. Toronto,  
D.Sc. Leiden, F.L.S., F.R.E.S., F.Z.S.  
*Dean of the Faculty of Engineering,*  
D. A. George, B.ENG. McGill, M.S. Stanford, Sc.D. M.I.T.  
*Director of the School of Architecture,*  
Douglas Shadbolt, B.ARCH. Oregon, F.R.A.I.C.  
*Dean of the Faculty of Graduate Studies,*  
John Ruptash, B.Sc. Alberta, M.A.Sc., PH.D. Toronto  
*Director of the School of International Affairs,*  
H. Edward English, B.A. British Columbia,  
PH.D. California  
*Director of the School of Social Work,*  
Swithun Bowers, B.A. Ottawa, M.Sc. Columbia

*Director of Planning,*  
G. Ross Love, M.A. Western Ontario, PH.D. Toronto  
*Dean of Student Services,*  
Victor F. Valentine, M.A. Toronto  
*Provost of Residences,*  
Munro Beattie, A.M., PH.D. Columbia  
*Director of Counselling and Health Services,*  
Norman D. Fenn, B.S., M.ED. Springfield  
*Registrar,*  
J. I. Jackson, D.F.C., B.A. British Columbia, M.F.A. Iowa  
*Bursar,*  
Frederick J. Turner, B.COM., M.A. Toronto, F.C.I.S.  
*University Librarian,*  
To be appointed  
*Director of the Computing and Data Processing Centre,*  
To be appointed  
*Director of the Physical Plant,*  
J. E. Whenham, B.ARCH. Manitoba, M.SC.(C.E.)  
Minnesota, M.R.A.I.C., P.ENG.

# Officers of Instruction

*Winter 1969-70*

## Professors, Associate Professors, Assistant Professors, Lecturers

*Richard D. Abbott*, B.A. Carleton, LL.B. Queen's, LL.M. Harvard,  
Associate Professor of Law

*A. N. Abdelhamid*, M.SC. Cairo,  
Assistant Professor of Engineering

*G. Stuart Adam*, B.J., M.A. Carleton,  
Assistant Professor of Journalism (on leave of absence, 1969-70)

*Claude Ake*, B.SC. London, M.A., PH.D. Columbia,  
Associate Professor of Political Science

*Dogan D. Akman*, B.SC. Montreal, M.A. Pennsylvania,  
Assistant Professor of Social Work

*Jon Alexander*, M.A. Southern Illinois, PH.D. Kansas,  
Assistant Professor of Political Science

*C. H. Amberg*, M.A. Queen's, PH.D. Toronto, F.C.I.C.,  
Professor of Chemistry

*W. Amtmann*, B.MUS. Toronto, M.MUS. Rochester, D.MUS. Strasbourg,  
Associate Professor of Music

*Duncan M. Anderson*, B.S.A. O.A.C., M.SC. Western Ontario,  
Associate Professor of Geography

*Douglas G. Anglin*, B.A. Toronto, M.A., D.PHIL. Oxford,  
Professor of Political Science (on leave of absence, 1969-70)

*J. W. ApSimon*, B.SC., PH.D. Liverpool,  
Associate Professor of Chemistry

*F. Atienza*, B.T. Salamanca, LIC.T. Innsbruck, LIC.J.C. Rome, D.J.C., D.S.T. Ottawa,  
Associate Professor of Spanish

*F. E. Banim*, O.M.I., B.A. Dublin, M.A. Cantab., S.T.L. Rome,  
Associate Professor of Biology, St. Patrick's College

*Marilyn J. Barber*, M.A. Queen's,  
Assistant Professor of History

*C. A. Barlow*, M.A. Toronto, PH.D. Leiden,  
Associate Professor of Biology

*L. Ray Barnett*, M.A., PH.D. Oregon,  
Assistant Professor of Psychology, St. Patrick's College

*R. G. Barradas*, B.SC. Liverpool, PH.D. Ottawa, F.R.I.C., F.C.I.C.,  
Professor of Chemistry

*G. R. Barratt*, B.A. Cambridge, PH.D. London,  
Assistant Professor of Russian

*Elizabeth Barrett*, B.A. Memorial, M.A. Alberta,  
Assistant Professor of English

*Richard D. Barton*, M.SC., PH.D. McGill,  
Associate Professor of Physics

*Isabel Law Bayly*, B.SC. Carleton, M.A. Toronto,  
Assistant Professor of Biology

- Alexander Munro Beattie*, B.A. Toronto, A.M., PH.D. Columbia,  
Professor of English
- Donald A. Beecher*, M.A. California,  
Assistant Professor of English
- D. G. Beer*, B.A. Bristol, M.A. McMaster,  
Assistant Professor of Classics
- Paul R. Beesack*, B.A. McMaster, A.M., PH.D. Washington,  
Professor of Mathematics
- J. G. Bellamy*, B.A. Oxford, M.A. Oxford and Nottingham, PH.D. Nottingham,  
Associate Professor of History
- Andrée Bergens*, B.S., M.A., PH.D. Columbia,  
Associate Professor of French
- David Karl Bernhardt*, B.A. Toronto, M.A. Michigan,  
Assistant Professor of Psychology
- Thomas W. Betz*, M.A. Missouri, PH.D. Illinois,  
Assistant Professor of Biology
- Malcolm J. Bibby*, M.Sc., PH.D. Alberta,  
Assistant Professor of Engineering
- Karel Bicha*, B.S. Wisconsin, PH.D. Minnesota,  
Associate Professor of History (on leave of absence, 1969-70)
- B. C. Bickerton*, M.A. Acadia,  
Associate Professor of History
- Gordon W. Bigg*, B.Sc. Alberta, M.Sc., PH.D. Illinois,  
Associate Professor of Engineering
- R. C. Biggs*, B.Sc. Queen's, M.S. Stanford, PH.D. McGill,  
Assistant Professor of Engineering
- F. W. Black*, B.Sc.(M.E.) Manitoba, M.A.Sc. Toronto,  
Associate Professor of Engineering
- R. C. Blockley*, B.A. Leicester, M.A. McMaster,  
Lecturer in Classics (on leave of absence, 1969-70)
- Jean F. P. Blondel*, LL.L., DIPL. ETU. SUP. Paris, D.LITT. Oxford,  
Visiting Professor of Political Science
- B. R. Bociurkiw*, M.A. Manitoba, PH.D. Chicago,  
Professor of Political Science
- A. R. Boothroyd*, B.Sc.ENG., PH.D. Imperial,  
Professor of Engineering
- Michael D. Bordo*, B.A. McGill, M.Sc. London School of Economics,  
Assistant Professor of Economics
- Desmond G. Bowen*, B.A. Carleton, M.A., PH.D. Queen's, F.R.S.A.I.,  
Professor of History
- Swithun Bowers*, B.A. Ottawa, M.Sc. Columbia, LL.D. Buffalo,  
Professor of Social Work
- William H. Bowes*, M.E. Nova Scotia Tech., M.Sc. Michigan,  
Professor of Engineering
- Thomas Newton Brewis*, M.COM., PH.D. Durham,  
Professor of Economics
- Adam Bromke*, M.A. St. Andrews, PH.D. Montréal and McGill,  
Professor of Political Science

- J. A. Brook*, B.A., M.A. Alberta,  
Assistant Professor of Philosophy
- C. M. Brown*, B.A. Harpur, PH.D. Columbia,  
Assistant Professor of Art
- David J. Brown*, B.SC. Birmingham, PH.D. Cornell,  
Assistant Professor of Physics
- R. L. Brown*, B.SC. McGill, PH.D. Edinburgh,  
Associate Professor of Geology
- G. P. Browne*, M.A. British Columbia and Oxford, D.PHIL. Oxford,  
Associate Professor of History
- Hyman Burshtyn*, M.A. McGill,  
Associate Professor of Sociology
- Elinor J. Burwell*, B.A. Toronto, M.A. Carleton,  
Assistant Professor of Psychology
- M. L. Cabilio*, L.PAED. Belgrade, M.S.S. Montréal,  
Assistant Professor of Social Work
- D. J. Cahill*, O.M.I., B.A. Ottawa,  
Assistant Professor of Physics, St. Patrick's College
- M. Ian Cameron*, B.A. Toronto,  
Assistant Professor of English
- Margaret M. Campbell*, M.B., CH.B. St. Andrews, M.A. Carleton,  
Lecturer in Psychology, St. Patrick's College
- G. R. Carmody*, A.B., PH.D. Columbia,  
Assistant Professor of Biology
- Richard Lee Carson*, M.A. Minnesota, PH.D. Indiana,  
Associate Professor of Economics
- A. L. Carter*, M.SC. Dalhousie, PH.D. McGill,  
Associate Professor of Physics
- R. Caterina*, B.COM. Toronto, M.B.A. New York, C.A.,  
Associate Professor of Accounting
- Chuni Lal Chakrabarti*, B.SC. Calcutta, M.SC. Birmingham, PH.D. Belfast, F.R.I.C.,  
F.C.I.C.,  
Associate Professor of Chemistry
- G Y. Chao*, M.SC., PH.D. Chicago,  
Associate Professor of Geology
- V. K. Chari*, M.A., PH.D., Banaras,  
Associate Professor of English
- E. U. Choudhri*, M.A. Panjab,  
Assistant Professor of Economics
- David Chung*, B.A. Doshisha, B.D. Toronto, PH.D. Yale,  
Associate Professor of Religion and History, St. Patrick's College
- John Churchill*, B.MUS. London, F.R.C.O., G.R.S.M., L.R.A.M., A.R.C.M.,  
Associate Professor of Music
- Kevin F. Clancey*, B.SC. St. Mary's, M.SC. Purdue,  
Assistant Professor of Mathematics
- G. E. Clarke*, B.A. S.D.U., B.COMM. St. Patrick's, M.A. Ottawa,  
Associate Professor of Economics, St. Patrick's College



- R. L. Clarke*, B.SC. Alberta, PH.D. McGill,  
Professor of Physics
- S. G. Clarke*, B.A. Saskatchewan, PH.D. Duke,  
Assistant Professor of Philosophy
- Richard T. Clippingdale*, M.A. Toronto,  
Assistant Professor of History
- P. Clive*, B.A., PH.D. London,  
Professor of French
- T. James S. Cole*, B.SC. London and Carleton, PH.D. Cambridge, A.C.G.I.,  
Associate Professor of Physics
- David C. Coll*, M.ENG. McGill, PH.D. Carleton,  
Associate Professor of Engineering
- Odette Condemine*, B.A. St. Patrick's, M.A. Ottawa,  
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- Florence Cousin*, LIC. D'ANGLAIS, D.E.S. Paris, D. in Linguistique Nanterre,  
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Assistant Professor of Psychology
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Associate Professor of Mathematics
- Vlastimil Dlab*, RNDr., c.sc. Charles University  
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Professor of Mathematics
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Sessional Lecturer in History\*
- M. D. Olson*, B.A.SC. British Columbia, M.SC., PH.D. Cal. I. T.,  
Sessional Lecturer in Engineering\*
- Pierre O'Neil*, B.A. Sherbrooke, M.A. Laval,  
Seminar Leader in Journalism\*
- D. F. Page*, B.SC. Queen's, D.I.C., PH.D. London,  
Sessional Lecturer in Engineering\*
- Madeleine Pelletier*, B.A. Ottawa,  
Sessional Lecturer in Spanish\*
- Jozinus Ploeg*, "Ir" degree Delft,  
Sessional Lecturer in Engineering\*

\*Part time



*Virginia Prince*, B.A. Toronto,  
Sessional Lecturer in Chemistry\*

*Robert Prinsky*, B.Sc. McGill, M.S. Columbia,  
Sessional Lecturer in Journalism\*

*M. Puerto*, B.A. Youngstown,  
Sessional Lecturer in Spanish\*

*F. E. Raney*, B.ENG. Queen's,  
Demonstrator in Physics\*

*E. Rolfe*, B.Sc. London,  
Demonstrator in Physics\*

*N. G. Ross*, B.A. Toronto, C.A.,  
Sessional Lecturer in Accounting\*

*Agatha Rueter*, B.A. Carleton,  
Sessional Lecturer in German\*

*W. F. Ryan*, S.J., B.A. Loyola, M.A. Missouri, PH.D. Harvard,  
Sessional Lecturer in Economics\*

*Grace Sangster*, B.A. Toronto,  
Demonstrator in Physics\*

*P. W. R. Sargeant*, B.Sc. Carleton,  
Senior Demonstrator in Physics\*

*S. Sarkany*, B. ès L., DIP. SC. POL. Paris, D.U. Strasbourg,  
Sessional Lecturer in French\*

*Regine Schmidt*, DR. MED. München,  
Sessional Lecturer in German\*

*H. Schrecker*, L. ès L. AIX, M.A., PH.D. Georgia,  
Sessional Lecturer in French\*

*D. Silcox*, M.A. Toronto,  
Sessional Lecturer in Art\*

*J. A. Soles*, M.Sc. British Columbia, PH.D. McGill,  
Sessional Lecturer in Geology\*

*A. D. Stanley*, M.Sc., PH.D. British Columbia,  
Sessional Lecturer in Geography and Geology\*

*T. R. Swabey*, B.A. Princeton, LL.B. Ottawa,  
Sessional Lecturer in Law\*

*F. Szabo*, M.Sc. Queen's, PH.D. Birmingham,  
Sessional Lecturer in Physics\*

*R. J. Talbot*, B.Sc. Hull,  
Senior Demonstrator in Chemistry\*

*Stafford Tavares*, B.ENG. McGill, M.Sc. Cal. I.T., PH.D. McGill,  
Sessional Lecturer in Engineering\*

*Michael Thompson*, B.A., Oxford,  
Sessional Lecturer in English\*

*Sonia Tilson*, M.A., DIP.ED. Wales,  
Sessional Lecturer in English\*

*Jo Tombaugh*, B.A. Depaw, M.A., PH.D. Missouri,  
Sessional Lecturer in Psychology\*

\*Part time

*Joan Topolski*, B.A. Toronto,  
Sessional Lecturer in Journalism\*

*Halina van de Lagemaat*, B.A. Carleton,  
Sessional Lecturer in Russian\*

*P. van Rutten*, D.P.F.E. Sorbonne,  
Sessional Lecturer in French\*

*M. Vernet*, L. ès L. Paris, D.E.S. Lyon, Agrégé des Lettres Modernes,  
Sessional Lecturer in French\*

*David Watters*, B.A. Queen's,  
Sessional Lecturer in Political Science\*

*Hildegard Webber*, Cert. Bav. H.T.C. Erlangen,  
Sessional Lecturer in German\*

*C. N. Wells*, B.A. Carleton,  
Sessional Lecturer in Spanish\*

*Marjorie Wesche*, B.A. Cornell, M.A.T. Oberlin,  
Sessional Lecturer in Spanish\*

*Martin Westmacott*, B.A. Alberta, M.A. Carleton,  
Sessional Lecturer in Political Science\*

*Eva Whitaker*, B.A. British Columbia,  
Sessional Lecturer in English\*

*Eliezer White*, B.Sc. Philippines, M.S. Michigan,  
Senior Demonstrator in Biology\*

*Mary A. Wickens*, B.Sc. Manitoba,  
Demonstrator in Geology\*

*G. Peter Wilson*, DIPL.S.H.S. Strathclyde,  
Sessional Lecturer in Accounting\*

*Helen Wilson*,  
Seminar Leader in Journalism\*

*Mary L. Wilson*, M.A. Carleton,  
Sessional Lecturer in English\*

*Sydney F. Wise*, B.A., B.L.S. Toronto, M.A. Queen's,  
Research Adviser in History\*

*D. M. Wood*, M.A. Toronto, PH.D. McMaster,  
Adjunct Professor in Biology\*

*David A. Wright*, B.Sc. Alberta, S.M., E.E. M.I.T.,  
Sessional Lecturer in Engineering\*

*Anna Wurtele*, M.A. McGill,  
Sessional Lecturer in English\*

*Janice Yalden*, B.A. Toronto, M.A. Michigan,  
Sessional Lecturer in Spanish\*

\*Part time

# **Summary of Regulations**

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## **GENERAL INFORMATION**

Carleton University has Faculties of Arts, Science, Engineering, and Graduate Studies. Schools of Commerce, Journalism, and Public Administration are associated with the Faculty of Arts, as are interdepartmental programs of Soviet and East European Studies, and Comparative Literature. The School of Architecture is associated with the Faculty of Engineering. The Faculty of Graduate Studies includes the Institute of Canadian Studies and the School of International Affairs.

The University is situated on two campuses, of which the main campus is the Rideau River Campus. The St. Patrick's campus accommodates St. Patrick's College, which is a division of the Faculty of Arts, and the School of Social Work.

The University offers programs of undergraduate study leading to bachelor's degrees in Arts, Journalism, Commerce, Science, Engineering, and Architecture; and to a certificate in Public Service Studies. The University's Faculty of Graduate Studies offers the M.A., M.Sc., M.Eng. and Ph.D. in certain fields of Arts, Science, and Engineering, including a Graduate Diploma and the M.A. in Public Administration, the M.A. in Canadian Studies and in International Affairs, the B.J. as a post-graduate year, and the M.S.W. degree. Summaries of the programs are given in the attached table.

## **THE GENERAL REGULATIONS**

The General Regulations of the University govern Admissions; Registration including course selection, course load, changes and withdrawal; Academic Standing including course standing, promotion, probation, and graduation; and Examinations.

The General Regulations as stated in this Calendar include the main legislation governing admissions and standing as approved by the Senate and interpreted by the Senate Committee on Admission and Studies. The Registrar is responsible for administering the regulations in a way consistent with academic good sense and the equitable treatment of all students.

Students are invited to consult the Registrar about the interpretation of the regulations. Any student has the right to appeal the application of a regulation to his particular situation to the Committee on Admission and Studies, and the Registrar will assist in the preparation of such appeals.

## **Admissions**

### **Admission Requirements**

Persons attending the University to follow programs of study leading to a degree, diploma, or certificate must be formally admitted.

Normal admission requirements to Qualifying University Year, the equivalent to Ontario Grade 13, are Junior Matriculation (Ontario Grade 12), with a 70% average, in English; another language; Algebra and Geometry; History; either Physics and Chemistry, or an additional language; and one other subject acceptable for the Secondary School Diploma. Scholastic aptitude tests are also required.

Normal admission requirements to First Year are as indicated by the Faculties. Admission requirements are subject to change, and persons interested in applying should ask for a copy of the Admissions bulletin, which is published later in the year and may incorporate amendments to requirements in this Calendar.

Persons lacking the requirements above may be admitted as mature matriculants, the requirements for which are that the applicant be twenty-three years of age, and give evidence of the probability of success in university studies. Persons under twenty-three may be admitted if their record in several courses taken as a part-time special student indicates the probability of their success.

Normal requirements for admission on transfer from another university with advanced standing are a 60% (C—) average, and no outstanding failures. Transfer students will normally be credited with the full year's previous work, but departments may require additional courses to fulfill the major program.

Normal admission requirements for graduate work are as indicated by the Faculty of Graduate Studies.

Applicants should note that in view of limited accommodation in certain programs, holding the admission requirements can only establish eligibility for selection to the University.

## **Admission Requirements — Equivalent Certificates**

The following certificates recognized as equivalent to the Ontario Secondary School Graduation diploma may be accepted to meet admission requirements for Qualifying University Year:

Quebec	Quebec High School Leaving, or McGill Junior Matriculation, or equivalent (Grade 11)
Alberta, Manitoba, Newfoundland, Nova Scotia, Saskatchewan	Junior Matriculation (Grade 11)
British Columbia, New Brunswick	Junior Matriculation (Grade 12)
Prince Edward Island	First Class Licence or Second Year Certificate from Prince of Wales College
United States	High School Graduation

The following certificates recognized as equivalent to the Ontario Grade 13 certificate may be accepted to meet admission requirements for First Year:

Quebec	Quebec Senior High School Leaving Certificate, or McGill Senior Matriculation (Grade 12)
Alberta, Manitoba, Nova Scotia, Saskatchewan	Senior Matriculation (Grade 12)
British Columbia, New Brunswick	Senior Matriculation (Grade 13)
Prince Edward Island	Honour Diploma if Third Year, Prince of Wales College
England, N. Ireland, Wales	The General Certificate of the English Universities and the Welsh Joint Education Committee with passes in five subjects, including two at Advanced Level
Scotland	The Scottish Universities Entrance Board's Certificate of Attestation of Fitness

# Summary of Courses

	Arts	Journalism	Commerce
Degree	B.A. B.A. (Honours)	B.J. (Honours)	B.Com. (Honours)
Divisions in which offered	Day & Evening	First 2 years D & E; last 3 years Day only Also as grad. year	Day & Evening One year must be taken in full-time stu
Length of course <sup>(1)</sup> from Jr. Matric	4 years 5 years for honours	5 years	5 years
Length of course <sup>(1)</sup> from Sr. Matric	3 years 4 years for honours	4 years	4 years
Requirements for admission: to Qualifying Univ. Year	Junior matriculation (Ont. Grade 12 or equivalent) in the following: English; a language other than English; Mathematics I and II; History Physics and Chem., or additional lang.; one other acceptable for the Secondary School Graduation diploma with 70% general average. Also scholastic aptitude tests.		
Requirements for admission: to First Year	<p>Senior Matriculation (Ont. Grade 13) in:</p> <p>(1) English As for Arts</p> <p>(2) a language other than English Average: 65%</p> <p>(3), (4) two options, chosen from history, geography, a second language, a science, Mathematics A or Mathematics A and B or 2 or 3 of algebra, geometry, trigonometry. (Any offering or combination of offerings in Mathematics will count only as one option)</p> <p>Average: 60%</p> <p>For Honours: 65%</p> <p>For specific major requirements see page 22.</p> <p>For requirements regarding early admission, See Page 6.</p> <p>The above requirements apply to students who take Grade 13 in one year; students spending two years in Grade 13 must present five subjects.</p> <p>All applicants must take Scholastic Aptitude Tests (verbal and mathematical) of the Service for Admission to College and University or the College Entrance Examination Board.</p>		
Annual tuition <sup>(2)</sup>	\$556.50	\$556.50	\$556.50
<sup>(1)</sup> Length shown is that for full-time students; part-time students plan courses over longer periods.			



Science	Engineering	Architecture	Graduate Studies
B.Sc. B.Sc. (Honours)	B.Eng.	B.Arch.	M.A., M.Sc., M.Eng., Ph.D., in certain fields of Arts, Science, and Engineering. Graduate Diploma and M.A. in Public Admin., M.A. in Canadian Studies, M.A. in International Affairs, M.A. in Comparative Literature, B.J. as post-graduate year. For details, see pp. 67-69.
Day & Evening (Certain senior courses offered day division only)	Day only	Day only	
4 years 5 years for honours	5 years	6 years	
3 years 4 years for honours	4 years	5 years	
			Other
(1) Mathematics A and B or algebra, geometry and trigonometry (2), (3) two experimental sciences, chosen from biology, chemistry, physics (4) an option, chosen from English, history, geography, a language, or a third science  Average: 60% For honours: 65%	(1) Mathematics A and B or algebra, geometry and trigonometry (2) physics (3) chemistry (4) an option, chosen from English, a language other than English, history, geography, biology  Average: 60%	(1) Mathematics A and B, or algebra, geometry and trigonometry (2) physics (3), (4) two of: Biology, Chemistry, English, Geography, History, a language other than English.  Average: 60%	Certificate course in Public Service Studies  Special programs of one or more subjects, chosen from those offered in the degree course or in the Extension Department, may be planned to meet the needs of individual students, including those without jr. matric. as well as those with post-grad. degrees.
Applicants from other provinces must present acceptable equivalent certificates generally required for admission to universities in their own provinces. (see p. 3).			
\$556.50	\$616.50	\$616.50	\$97.50 or \$117.50 per course for part-time

<sup>(2)</sup>The Board of Governors reserves the right to amend its published schedule of fees without notice.



## Admission Procedures

Application for admission is made on prescribed forms to the Registrar. Ontario Grade 13 students should use the General Admissions Application Form available in the high schools. All others should use the University Application Form available from the Registrar.

Last dates for receipt of applications are as follows:

April 1	Candidates applying for Early Final Admission
July 5	Candidates whose documents originate outside Canada
August 1	Candidates applying as mature matriculants
August 1	Applicants for transfer from other universities
August 15	All other applicants except those for Graduate Studies

Early Final Admission will be granted applicants to Qualifying University Year who apply before April 1 and are from provinces where high school is normally complete with Junior Matriculation, who present a 75% average in Junior Matriculation Christmas and Spring examinations; have written the Scholastic Aptitude Tests (verbal and mathematical) of the Service for Admission to College and University (S.A.C.U.) or the College Entrance Examination Board; and have a satisfactory report from the high school principal. Admission is dependent on the student writing his final examinations.

Early Final Admission will be granted applicants to First Year who apply before April 1, present good standing in Junior Matriculation and in an interim report of Grade 13 standing; the S.A.C.U. Scholastic Aptitude Tests (verbal and mathematical) or the College Entrance Examination Board; and have a satisfactory Principal's Report. Admission is dependent on the student completing the school year to the Principal's satisfaction.

## Admission Status

A student's admission status is determined as follows:

Undergraduate students are those admitted under the provisions of the Faculties of Arts, Science, and Engineering into undergraduate programs of study.

Graduate students are those admitted under the provisions of the Faculty of Graduate Studies.

Special students are those registering in degree credit courses without being formally admitted to the University. Special students may be taking such courses to qualify for admission or re-admission, to improve their professional or other qualifications, or for personal interest.

## Registration

### Registration Status

Every student attending the University is required to register in his courses with the Registrar at the time designated for the Session, and to inform the Registrar of any changes in registration.

A student's registration status is determined as follows:

Full-time students are those registered in the Winter Session in four or more courses, or the equivalent.

Part-time students are those who have been formally admitted to the University and are registered in less than four courses or the equivalent in the Winter Session, or are registered in the Summer Session.

Students who do not register at the times designated for their Session will be charged a late registration fee.

Students intending to take second term half-courses must register in these courses during September registration.

## **Course Selection**

A student proceeding to a degree, diploma, or certificate must select his courses according to the requirements set by the general regulations, his faculty, and his major department.

A student's selection of courses must be approved by his major department, the department offering each course, and the Registrar.

Part-time students must have their course pattern and degree requirements evaluated at the latest after taking five courses.

Students planning to undertake professional training beyond their undergraduate studies should ensure that their programs meet the requirements of admission to their intended school or faculty.

## **Course Load**

Normal course load for a full-time undergraduate or graduate student in the Winter Session is five credit courses, except in honours and engineering programs.

Normal course load for a part-time undergraduate or graduate student in the Winter Session is two credit courses.

Normal course load for a special student in the Winter Session is two credit courses. Students may register in a maximum of two courses in the Summer Session, i.e. two evening courses, or one evening and one day course, or two day courses.

A student may exceed the normal course load only with the Registrar's permission, which may be granted only with B standing in the student's previous session at this University.

## **Auditing Courses**

A student may with the instructor's consent register to audit a course (i.e. attend without receiving credit) in addition to those being taken for credit.

Full-time students may register to audit a course without an additional fee; all others must pay the regular course fee.

Students who enrol to audit without so indicating in their registration may endanger their academic status.

## **Course Changes**

Changes of course must be applied for at the Registrar's Office.

A course change must be made within three weeks following the first day of classes in the course.

# Withdrawal

Students wishing to withdraw from a course or from the University must apply to the Registrar on the designated form or by letter.

Students withdrawing from the University must return their identity card, any refund of fees being calculated from the date of its receipt.

A student who withdraws from a course or the University after February 15 (or October 31 for first term half courses) in the Winter Session, or July 28 in the Summer Session, will be shown as absent from the final examinations, will not be granted supplemental privileges, and will not be allowed remission or refund of fees.

# Proficiency in English

All students are required to be proficient in the English language. In any year of his course, an instructor may refer a student to the Department of English, which will decide whether he must receive additional tuition.

# Academic Standing

## General

To gain standing in a course, a student must meet the course requirements for attendance, term work, and the writing of examinations.

Each instructor will inform his class early in the session of the relation of attendance to course grades, and whether attendance records will be kept.

The Senate may at any time require a student to withdraw from the University if his conduct, attendance, work, or progress is deemed unsatisfactory.

It is the responsibility of the major department to ensure that a student progresses in an orderly manner, according to General and departmental regulations, and that Qualifying Year requirements are met without undue delay.

## Standing in Courses

Standing in a course will be determined by departments.

Standing in a course will be shown by alphabetical grades. Grades used, with their corresponding grade points, are as follows:<sup>(1)</sup>

A+ — 12	B+ — 9	C+ — 6	D+ — 3
A — 11	B — 8	C — 5	D — 2
A— — 10	B— — 7	C— — 4	D— — 1

Standings to represent special circumstances are as follows:

- Aeg — Pass standing granted although absent from final examinations.  
Aegrotat standing is granted only by the Registrar in response to a student's application which meets the stipulations for Examinations below.
- Pass — Pass standing in a supplemental examination.

The following categories of standing are without academic credit:

- F — Failure
- F(ns) — Failure, but with supplemental privileges withdrawn because of incomplete term work or an unacceptably low mark in the final.
- Wdn — Withdrawn in good standing
- Abs — Absent from final examination

<sup>(1)</sup>For the purpose of interpreting letter grades, the percentage equivalents are as follows:

A+ = 90-100	B+ = 77-79	C+ = 67-69	D+ = 57-59
A = 85- 89	B = 73-76	C = 63-66	D = 53-56
A— = 80- 84	B— = 70-72	C— = 60-62	D— = 50-52

## Promotion — Full-time Students

To be promoted to a higher year, a full-time student must pass at least four courses in the April finals and have a C— standing or higher in at least one course.

A student who passes at least three courses in April will be considered to have passed his year conditionally. He must pass a fourth course and have at least C— standing in one of the four by the end of the August examinations (including supplementals and summer course finals) to be promoted to a higher year. (See additional requirements for Science and Engineering students below).

A student has failed his year if

- (a) he does not pass at least three courses in April;
- (b) after a conditional pass in April he does not pass four courses and have a C— in one course by the end of the August examinations.

A student who fails his year will retain credit only for courses with C— standing or higher. If after a conditional pass in April he registers in the Summer Session and fails again to meet promotion requirements in the August Examinations, he will forfeit D grades from both Winter and Summer Sessions. (See requirements for students in Engineering below).

A student who fails his year will be classified as follows:

**Category I:** Failure in a year but with a total of 8 grade points in two passed courses, or 6 grade points in three passed courses, or 4 grade points in four or more passed courses. A student in Category I may return in the next session, but will be on probation.

**Category II:** Failure in a year with less than the grade requirements of Category I. A student in Category II cannot register as a full-time student for one academic year. He may choose to register as a part-time student in not more than two courses during this year, but must achieve a C— average in these courses, without a failure, or delay his return to full-time studies for another year. A Category II student returning to full-time studies will be on probation.

**Category III:** Failure in a year after any previous failed year at any university. A student in Category III forfeits his undergraduate status. To be considered for re-admission, he must enrol part-time as a special student and pass five courses and average C— during a minimum of two years.

To enter Third Year, a student must have at least a C— average in the courses of his major or majors, and must also comply with any additional requirements of his program.

A student below the required standing at the end of the year prior to his graduation may have to withdraw from his major.

## Promotion — Additional Conditions for the Faculty of Science

To be promoted to Second Year and be eligible to enter a major program, full or part-time students in Science must, in addition to the requirements above, have C— standing or higher in each of two courses, one of which must be in the intended major subject. Additional requirements may be set by the Faculty.



## Promotion — Additional Conditions for the Faculty of Engineering

In order to qualify for promotion from one year to the next, an engineering student must have passed either the final or the supplemental examination in every subject of his program, with a weighted grade point average of at least 3.0.

To qualify for supplemental examination privileges a student must attain a weighted grade point average of at least 1.90 in the final examinations.

If, after final and supplemental examinations, a student has failed to achieve standing in a subject which is a prerequisite for the course work of the following year, he may repeat the year's work or clear the deficiency as a part-time student. If the failed subject is not a prerequisite for the course work of the following year, the student may be conditionally promoted and may be permitted to repeat the failed subject as an extra subject.

If the academic standing of an engineering student does not meet the minimum promotion requirements, he may *either* clear his deficiency as a part-time student *or* apply to the Committee on Admission and Studies for permission to repeat the year's work. If permission is granted, he will be placed on probation for that academic year. The academic load for a repeated year in engineering must be at least the equivalent of 15 hours of lectures and 9 hours of laboratory a week or 18 hours of lectures and 6 hours of laboratory a week. Subjects in which B— or better was obtained need not be repeated. The required subjects of the succeeding year may be included as part of a repeated year program provided B— or better was obtained in the prerequisite subjects.

A student who fails both the regular and supplemental examinations in either Mathematics 69.305\* or Mathematics 69.306\* may, with the approval of his program adviser, elect another course in mathematics to complete the degree requirements.

## Promotion — Part-time Students

Part-time students who fail three courses in succession are not eligible for further registration.

Part-time students must pass three of their previous five courses with a C— standing or higher in one course to be eligible for further registration.

## Probation

A full-time student on probation and registered in five courses must pass five courses with at least C— standing in one course, or four courses of the five with a C average for the four. If he is registered in four courses, he must pass all four with at least C— in one. Standing is to be as determined at the end of August supplemental or Summer Session final examinations.

A part-time student on probation must pass five courses in succession.

## Graduation

To qualify for graduation with a pass degree a student in programs other than Engineering must meet the following requirements.

Regulations for Engineering students are on page 59.

Completion of the number and pattern of courses required;

At least C— standing in half the courses taken at the University;

An average of at least C— in courses in his major subject or subjects;

The recommendation of his major departments and Faculty.

To meet the requirements for the C— average in the major stated above, only those courses in the major necessary to make up the required total for graduation in the major department need be counted, but all obligatory courses must be counted.

Qualifying Year courses taken to remove entrance deficiencies will be excluded in calculating the C— average.

A Carleton student who takes courses elsewhere with a letter of permission, may with departmental approval use the grades to meet graduation requirements.

Students in the pass course who have a B+ average on courses counted toward graduation, and who are recommended by their major departments, will be designated as graduating *with distinction*.

Students expecting to graduate in the spring must apply for graduation at the Registrar's Office by February 1, and those expecting to graduate in the fall, by September 1.

## Examinations

### Mid-term Examinations

Mid-term examinations are held in all Qualifying and First year courses, and in other courses an instructor may require, at times shown in the calendar of the Academic Year.

A student who is absent from a mid-term examination may incur penalties at the discretion of the department concerned.

### Final Examinations

Final examinations for half courses and full courses are scheduled at the times shown in the calendar of the Academic Year.

A student who is unable to write a final examination because of illness or other circumstances beyond his control, or whose performance on the examination has been impaired by such circumstances, may on application be granted permission to write a special final examination. Such applications must:

- (a) be made in writing to the Registrar *not later than* one week after the date of the examination; and
- (b) be fully supported in the case of illness by a medical certificate or by appropriate documents in other cases.

Applications for special final examinations will be considered for aegrotat standing, but this will be granted only in exceptional circumstances and if term work has been of high quality.

A student who is absent from a final examination without an acceptable reason will not be granted supplemental privileges.

### Special Final Examinations

Special final examinations are written at the time of the supplementals.

Special final examinations may be written only by students whose reason for missing a final examination has been accepted.



Standing in Special final examinations is shown by alphabetical grades.

A student granted aegrotat standing may apply for permission to write a special final examination, but may write only at the next supplemental examination period.

## **Supplemental Examinations**

Supplemental privileges may be granted under the following conditions:

A student registered in five or more courses may write two supplementals or two special supplementals;

A student registered in four courses may write one supplemental and one special supplemental only, or two special supplementals;

A student registered in one, two, or three courses, who fails only one course, may write one supplemental.

Supplemental privileges will not be granted:

To a full-time student who does not pass at least three courses in April;

To a Summer Session student who after a conditional pass in April has failed to meet promotion requirements in the August examinations, unless he is a potential fall graduate.

To a part-time student registered in two or three courses who has failed two courses.

A student may not write a supplemental in a course graded F(ns) or Abs, but other regulations may apply to students in honours, Engineering, and Graduate Studies.

No student may write supplemental examinations, including special supplementals, in more than two courses or the equivalent number of half courses in any academic year.

The total number of supplementals, special supplementals, and Summer School examinations a student writes in August may not exceed two.

If a supplemental examination is failed, the student must repeat the course before writing another examination in it.

Supplemental examinations are graded only "Pass" or "Fail".

Application to write supplemental examinations must be made at the Registrar's Office before the designated date.

Supplemental examinations must be written at the next supplemental examination period.

Students may apply to write supplemental examinations at educational institutions outside Ottawa.

## **Special Supplemental Examinations**

A student wishing to raise a grade in a course already passed may apply to write a special supplemental examination.

Special supplementals are graded by the alphabetical scale, but the grade obtained supersedes the grade of the final examination.

Conditions governing special supplemental examinations are as defined above. Special supplementals are not available to special students.

No more than three special supplementals may be taken in a degree program, including Qualifying year.

A special supplemental in a course may be written only once, and at the next scheduled examination period.

The grade assigned a special supplemental will be based on the whole year's work, including the examination.

## **Review of Grades**

A student who has failed one or more courses may obtain a review of his final grades by applying to the Registrar within fourteen days of the release of the results.

Requests for review are dealt with by department chairmen in consultation with members of the staff.

The fee for review is \$10 per examination, which is refundable if the grade is raised.

Students awaiting the outcome of a review must still apply for supplemental examinations by the prescribed deadline.

## **Release of Grades**

Official final grades are released only by the Registrar. Reports are mailed as soon as possible after release has been authorized.

# **General Regulations for Honours Degrees**

A student wishing to enter an honours program must, in the first instance, apply to the Chairman of the department in the honours subject. Admission to honours at any level will require the consent of the department in which the honours subject is taken, and the approval of the appropriate committee on honours.

Each department's course patterns are detailed individually and departmental requirements in the matter of prerequisites to honours courses lie within departmental discretion. The student should therefore consult the Calendar instructions for honours programs in the appropriate department. Departmental capacities for honours students will depend on department resources and the nature of the program.

## **Entry to Honours programs**

For entry to Year I of an honours program a student must have 65% or better in Grade 13 or 4.0 or better grade point average in Qualifying University year and the recommendation of the honours department.

For entry to and remaining in Year II of an honours program, a student must have 4.0 or better grade point average in the honours subject, 3.6 or better grade point average overall, and the recommendation of the honours department.

For entry to and remaining in Year III of an honours program, a student must have obtained in the courses of the Second year 4.0 or better grade point average in the honours subject, 3.6 or better grade point average overall, and the recommendation of the honours department.

A student in his final year of a Pass degree wishing to be considered for entry to an honours program must apply to the honours department to have his name withdrawn from the graduation list before March 1 of that year. If subsequently he is not accepted for an honours program, his name will be returned to the graduation list.

For entry to and remaining in Year IV of an honours program, a student must have obtained in the courses beyond the First year 4.0 or better grade point average in the honours subject, 3.6 or better grade point average overall; in addition a grade of C— or better is required in at least half of the courses taken in Year I and beyond, and the recommendation of the honours department.

Students applying for admission to Honours at Carleton after having obtained a degree from Carleton or another university shall meet the same criteria as detailed for entry to Honours at Year IV level.

No student may be admitted to Honours without satisfying the requirements for entry to the corresponding major program.

The consent of the department for entry to an honours program cannot rely on the application of a set of departmental requirements with an average (g.p.a.) in the honours subject, or overall, that is higher than those set out above. A student who considers that he meets the requirements for entry to Honours but who has not been accepted by any department may appeal to the appropriate faculty committee for review of his case. The committee will report to its faculty board on all such appeals.

## **Other Regulations**

A student wishing to improve his average may, with the permission of his honours department, take a supplemental or special supplemental examination, or may repeat a course, provided the total number of these examinations and repeated courses does not exceed three in his entire program beyond the Qualifying year.

For a student entering Honours at any time after the First year, the above limit of three supplemental or special supplemental examinations or repeated courses shall normally apply to his entire program beyond Qualifying University year.

Fourth year graduating essays, theses or special projects must be submitted to the chairman of the honours department before April 1, or such other date as the department may specify, for the Spring graduation, or by the first day of classes in September for the Fall graduation. If this requirement has not been met, the student must reregister for the course concerned and pay the appropriate fee.

A student who fails to maintain Honours standing must withdraw from Honours; he may apply for admission to a pass program.

## **Combined Honours**

A student wishing to enter a combined honours program must, in the first instance, apply to the chairman of each department of the honours subjects. The above regulations apply throughout except that the term “the honours subject” is to be replaced by “each of the honours subjects”, and “the honours department” by “each of the honours departments”.

See also

Honours Programs in the Humanities (p. 27)

Honours Programs in the Social Sciences (p. 27)

Honours Programs in Commerce (p. 29)

Honours Programs in Journalism (p. 33)

Honours Programs in Public Administration (pp. 38-39)

Honours Program in Soviet and East European Studies (pp. 43-45)

Honours Programs in the Sciences (pp. 52-53).

## Classes of Honours degrees

Four classes of Honours are awarded. They are determined as follows.

First Class	9.0 - 12 g.p.a. in Honours subject, and 6.0 or better g.p.a. overall
High Second	8.0 or better g.p.a. in Honours subject, and 5.0 or better g.p.a. overall
Second Class	6.0 or better g.p.a. in Honours subject, and 4.0 or better g.p.a. overall
Third Class	4.0 or better g.p.a. in Honours subject, and 3.6 or better g.p.a. overall

Departments may recommend the higher class of Honours degree in the case of a student one of whose indices is in the appropriate higher range and the other within 0.2 grade points of the higher range.

In addition the student must have C— or better in at least half the courses taken in Year I and beyond, and the recommendation of the honours departments.

To determine the class of degree for students with Combined Honours, the average is taken in each of the two subjects and the simple average of the two is used. If agreeable to both of the departments concerned, the final average may be computed on the basis of the weighted average of the required number of honours courses in the two subjects.

Departments may use discretion for establishing the class of degree in counting the number of honours courses where students have more than the minimum courses. Where a student in an honours program takes courses elsewhere with the permission of his department, the grades received on such courses may be incorporated with those obtained at Carleton University if his department so recommends.

The Honours degree will not be awarded to students taking less than the equivalent of five full courses for credit at Carleton University.

Students expecting to graduate in Honours in the spring should make application on the appropriate form in the Registrar's Office by February 1, and those expecting to graduate in the fall, by September 1.

## Fees

The annual composite fee includes tuition, Students' Association, Athletics, and Health Service fees, and where applicable laboratory, graduation, and summer survey camp fees. Because the calendar must be prepared so far in advance of the academic year the University must reserve the right to change fees without notice.

Arts, Commerce, Journalism, Science:

Students taking 4 or more subjects \$556.50

Part-time students taking fewer than 4 subjects (per subject):

Degree Credit Courses \$ 97.50

Non-credit Courses \$117.50

Engineering:

Full-time students \$616.50

Architecture:

Full-time students \$616.50

(See Withdrawal and Refund, p. 16-17).

Included in the above composite fee are the following:

	Part-time per subject	Full- time
Students' Association	2.00	17.50
Athletics	2.50	24.00
Health Services (including the cost of medical insurance premiums which are subject to change) see details p. 18		25.00
University Union Contribution (as voted by student body)		10.00

A non-refundable deposit of \$50.00 on fees will be required upon confirmation of early acceptance to Qualifying or First year.

Students are requested to have their own cheque books available at registration.

## Graduate Fee

See Faculty of Graduate Studies, p. 69.

## Late Registration Fee

\$10 first week after registration period

\$15 second week

Part-time students:

\$1 (per course) first week after registration period

\$2 (per course) second week

## Examination Fees

- a) Supplemental and special final examinations, written at Carleton University, per paper 5.00
- b) Examinations written at a university centre other than Carleton University, when permitted 10.00

## Transcript Fees

All students are entitled to two free transcripts. After these have been issued the fee is \$1.00 for the first, 50 cents for the second, and 25 cents for each additional copy at any one time of ordering.

Fees may be paid by any of the following plans:

- 1. Payment in full at the time of registration.
- 2. Payment in two instalments:
  - a) At registration— $\frac{1}{2}$  of the total tuition, plus Miscellaneous Fees (where applicable), and Deferred Payment Fee \$ .50 per half course (5 courses \$5.00).
  - b) At or before mid-session—the remaining half of the total tuition fee.
- 3. Payments in five instalments (winter session only):
  - a) At registration— $\frac{1}{5}$  of the total tuition, plus Miscellaneous Fees (where applicable), and Deferred Payment Fee \$1.25 per half course (5 courses \$12.50).
  - b) On the 15th of October, November, January, and February— $\frac{1}{5}$  of the total tuition fee.

## Withdrawal and Refund

see also p. 15.

The composite fee for full-time students is a charge for four subjects or more. No charge is made for the fifth or any additional subjects; conversely, no refund will arise



as a result of withdrawal from a subject by a full-time student unless the change alters his status from full-time to part-time.

Students who are forced to withdraw from a course, or from the University, are required to notify the Registrar in writing, or fill out the appropriate forms in his office, and to give their reasons for withdrawal. Students who withdraw from the University must return their identity card to the Registrar's office immediately. Refunds will be calculated by the date of receipt of the card.

### **Credits or refunds will be granted as follows:**

1. Cash refunds (for tuition paid).
  - a) Cash refunds will be granted in cases where students are compelled to withdraw on account of serious and continued personal illness.
  - b) In case a student who is regularly employed during the day is sent out of the city permanently by his employer or compelled so to change his working hours as to prevent his continuing at the University, a refund will be granted.
  - c) Cash refunds may also be granted in cases where the student is compelled to withdraw for other personal reasons, provided that these reasons are satisfactory to the University authorities.
2. Tuition not refunded or used may, if a certificate of credit is secured from the Bursar, be applied upon subsequent courses pursued in the University, provided such courses are taken within two years of the date of withdrawal of the student.
3. Miscellaneous fees and Deferred Payment fees are not refundable.
4. The portion of the tuition fee refunded is determined by the date of the return of the student identity card with a written notice of withdrawal to the Registrar's Office.
5. No application for withdrawal and refund will be considered if received after February 15 in the Winter Session (in the case of first term courses, October 31) or after July 28 in the Summer Session.

### **Residence**

A detailed statement of approximate cost of one year (8 months) at the University will be found on p. 273.

Residence fees, (including \$4.00 residence association fee), payable in one or two instalments are:

Single room \$890.00

Double room \$840.00

If paid in two instalments there is an additional deferred payment of \$8.00.

Total fee, or the first instalment, is due prior to admittance to residence.

First instalment (in addition to the room deposit) is \$443.00 for a single room, \$418.00 for a double.

The second instalment is due on January 2, and is \$430.00 for a single room and \$405.00 for a double room.

A deposit of \$25 must accompany applications and will become applicable to rental charges upon admission to residence. This will be refunded only under the following circumstances:

- a) If applicant fails to qualify for admission to Carleton University.
- b) If applicant is not allotted a place in residence.

### **Parking**

Permission to park on the campus is granted for a fee to students and others associated with the university, but this permission is conditional upon co-operation in



the observance of the regulations. Infractions will be penalized, and under certain circumstances cars will be towed away at the owner's expense and risk. In this, as in other respects, examination grades will be withheld from students owing sums of money to the university. Unless cause can be shown, the third infraction will lead to withdrawal of parking privileges. The university accepts no responsibility for cars or their contents parked or operated on the campus. Applications for parking permits and the regulations related thereto are available in the Business Office; students and staff who bring cars to the campus are expected to make themselves familiar with these regulations.

## **Delinquent Accounts**

If, when examination results are ready for publication, a student owes the University any account such as fees, library charges, traffic violation fines and other incidental bills, his results will not be released, his file will be sealed, and he will not be permitted to register again until such accounts have been paid in full.

## **LIBRARY REGULATIONS**

All persons taking courses in the University, and all graduates of the University in the Ottawa area are entitled to use the library the year round. As a condition of use of the library, all users must submit books, brief cases, bags, etc. for inspection at the exit, if requested to do so. Library hours are listed on the inside back cover. Most books may be borrowed for two weeks. Some books are placed on "Reserve" and may be borrowed overnight, for three days, or for one week. Alumni may not borrow reserve books, which are in heavy demand. If books are not returned when due, fines are charged. As noted under "Delinquent Accounts", examination grades and transcripts will be withheld from students owing money to the University. Reference books and some bound periodicals may not be taken from the library. Every undergraduate entering the Qualifying University or First year in the day division will be required to complete satisfactorily an exercise in the use of the library, including card catalogue, bibliographical sources, and standard reference works.

## **HEALTH**

At registration entering full-time students are required to submit the official medical record form completed by his personal physician.

Annually, at registration students are required to submit evidence of having had a chest X-ray or an intracutaneous tubercular skin test within the previous six months showing negative results. Students who object to the fulfilment of the above requirements on conscientious grounds must consult the University physician and provide a written statement giving the basis of objection.

Medical insurance is compulsory for all full-time students. Payment of the composite health fee at registration automatically enrolls the student in the University Medical Insurance program. Students may opt out of this program and receive a refund of a portion of the health fee by providing evidence of having adequate medical insurance coverage.

Overseas students are required to have hospital insurance while enrolled at the University. Coverage by the Ontario Hospital Services Commission is available after three months waiting period. The University has a plan available which will provide coverage during the waiting period.

Before participating in University extramural athletics, students must be certified physically fit for such participation by the University physician.

## ACADEMIC DRESS

The academic dress of Carleton University is a compromise between the style of hoods outlined in the American Intercollegiate Code and the dress of the ancient foundations of Britain and America. The Bachelor's hood is of simple or Oxford shape, made of black *stuff* and lined with two chevrons of red and black on a silver field. The border of the hood denotes the degree granted according to the following colour combinations: Arts—white; Journalism—white with a black cord sewn slightly in from the lower border; Science—golden yellow; Commerce—drab; Engineering—orange. The Master's hood, made of black silk, is again of the simple shape but open to show more of the lining. The borders follow the colour scheme just outlined. The Doctor of Philosophy hood is again made of silk, but completely opened to show the lining and provided with a purple border.

The Bachelor's gown, to be worn with the above hoods, is of full length, made of black *stuff*, with a gathered yoke behind, and long open-fronted sleeves. The Master's gown is of full style, made of black silk or rayon, with full gathered yoke behind and closed sleeves with an opening at the elbows. The Doctoral gown is the same style as the Master's, made of fine royal blue cloth with facings of a light blue silk.

The gown of the Honorary Doctor of Laws or of Science is a blue robe with bell-shaped sleeves, made of fine royal blue cloth with facings and sleeves in light blue silk. The hood is made of the same material as the gown, has the same lining as that for the degrees granted by examination, and is bordered with purple for the Degree of Doctor of Laws, dark red for the Degree of Doctor of Science and orange for the Degree of Doctor of Engineering.



# Faculty of Arts

Dean of the Faculty: David M. L. Farr, M.A., D.PHIL.

Associate Dean: Gordon C. Merrill, M.A., PH.D.

Assistant to the Dean: A. D. McLay, M.A., PH.D.

Division I: Director, A. Trevor Tolley.

Art	French	Music
Canadian Studies	German	Philosophy
Classics	History	Religion
Comparative Literature	Italian	Russian
English	Journalism	Spanish

Division II: Director, G. C. Merrill.

Accounting	Law
Anthropology	Political Science
Commerce	Psychology
Economics	Public Administration
Geography	Sociology
International Affairs	Soviet and East European Studies

## *Admission Requirements*

To the Qualifying University year of courses leading to the Bachelor of Arts degree: Junior Matriculation—the Ontario Secondary School Graduation Diploma in the General Course (Grade 12), or an equivalent certificate, with a general average of at least 70%.

Standing is required in the following subjects:

1. English
2. Mathematics
3. History
4. A language other than English
5. Science (Physics and Chemistry) or an additional language
6. One other acceptable for the Graduation Diploma

To the First year of courses leading to the Bachelor of Arts degree:

a) Completion of the Qualifying University year, *or*

b) Ontario Grade 13<sup>(1)</sup>, with a 60% general average in the following subjects:

1. English
2. A language other than English
3. and 4. Two options chosen from:
  - History
  - Geography
  - A second language
  - A science
  - Mathematics A, or Mathematics A and B, or two or three of Algebra, Geometry, Trigonometry. (Any offering or combination of offerings in Mathematics will count only as one option.)

The above requirements apply to students who take Grade 13 in one year; students spending two years in Grade 13 must present *five* subjects.

<sup>(1)</sup>Applicants from other provinces must present acceptable equivalent certificates generally required for admission to universities in their own provinces.

## Arts

For a major in Mathematics, one option must be Mathematics A and B.

For majors in Biology and Economics, one option must be Mathematics A, but it is recommended that students present Mathematics A and B.

For a major in Geography, it is recommended that students present Mathematics A. See also p. 39, Credit for Senior Matriculation courses.

All applicants will be required to present the results of the Scholastic Aptitude Tests (verbal and mathematical) of the Service for Admission to College and University or the College Entrance examination Board.

**Mature Matriculation**—A person over the age of twenty-three years who, though lacking the admission requirements specified above, can give evidence of the likelihood of success in university studies, may be admitted on probation either to Qualifying or to First year. Persons interested should consult the Registrar. This provision applies to persons wishing to study full-time. Others can test their capability by taking courses as part-time students in the Evening Division.

To the Second or subsequent years of courses leading to the Bachelor of Arts degree: Applications for admission to the Second or subsequent years will be evaluated on their merits, and advanced standing will be granted for studies undertaken elsewhere only when these are recognized as the equivalent of courses offered in Carleton University.

Every student will be required to complete at least his last five courses in Carleton University.

## Bachelor of Arts

*Bachelor of Arts* (Offered in both Day and Evening Divisions).

### *Course Requirements*

**Length of course.** Candidates in the B.A. degree program will take a total of twenty courses after Junior Matriculation, or fifteen after Senior Matriculation. See also Course Load, p. 7.

**Course selection.** The B.A. program is designed to provide opportunity for a liberal education, including specialization in one subject of study, called a *major*. A *combined major* in two subjects may be taken, with the consent of the departments concerned. Students majoring in a single subject will take from five to seven courses in that subject, depending upon departmental requirements, while students electing a combined major will take four or five courses in each subject of the major.

The choice of a major will normally be made upon entry to the Second year, in consultation with the department or departments concerned. A student who has not chosen a major at this point will be required to obtain approval for his courses from the Faculty adviser to undeclared majors. A change in major may be made only with the approval of both the departments concerned.

*Subjects for majors and combined majors are as follows:*

Anthropology, Art, Classics (Latin, Greek), Economics, English, French, Geography, German, History, Mathematics, Music, Philosophy, Political Science, Psychology, Religion, Russian, Sociology, Spanish. (In certain cases, and with consent of the Department of Biology, a major in Biology in the B.A. course may be taken.)

Courses will be selected from those listed under Details of Courses, p. 79, as follows:



*Qualifying University Year*

1. English 18.010.
2. A language other than English (a course numbered between 010 and 099).
3. Mathematics 69.010 or one of French 20.010, German 22.015, German 22.016, Greek 15.015, Italian 26.015, Latin 16.010, Russian 36.015, Spanish 38.015, Ukrainian 36.016. For students intending to major in Economics or Biology, standing in Mathematics 69.010 is required.
4. A science: Biology 61.100 or Chemistry 65.010 or Physics 75.010 or Geology 67.100.
5. History 24.014, or another language, or an additional science, or Mathematics 69.011.

*First Year*

Students are permitted to select any five courses, subject to departmental provision, from the list given below in order to satisfy the requirements of the First year. The "free choice" concept is designed to allow entering students to investigate the breadth and richness of a modern university's offerings in Arts and Science. Through this means, the student can sample a variety of subjects which he has not encountered in his previous education or explore a preferred group of subjects in greater depth or with greater personal satisfaction than was possible before. Basically, the "free choice" principle embodies in the curriculum the belief that a person learns best when he studies a subject in which he is genuinely interested.

In choosing courses from the list available for the First year, the student is strongly advised to consult the academic counselling service of the University. Every student accepted by the University will be notified by letter of the counselling facilities provided during the summer and will be invited to arrange an appointment with a qualified counsellor. In addition, representatives in the instructional departments stand ready to offer advice to students wishing to study in their disciplines. Many departments have prerequisite courses which must be taken in the First year if a student wishes to continue in a particular subject. Sample course patterns, containing these prerequisites, will be available through the counsellors. Normally students are advised not to take more than two courses from the same discipline in selecting courses in the First year.

While the University will make every effort to allow every entering student to enrol in a program of his choice, it is recognized that enrolments may have to be limited in certain of the more popular First year subjects. This limitation will be carried out, if necessary, on as equitable a basis as possible. At the time of their interview with the academic counsellors, students are encouraged to declare their interest in particular First year courses, especially those in which enrolments may have to be restricted.

*Courses Open to First Year Students, 1969-70***Accounting**

41.100, An Introduction to Accounting

**Anthropology**

54.110, Introduction to Anthropology

**Art**

11.100, Introduction to the History of Art



## **Arts**

### **Biology**

61.100, Introductory Biology

### **Chemistry**

65.010, Introductory Chemistry

65.100, General Chemistry

65.106, General Chemistry

### **Classical Civilization**

13.205, The Classical World

### **Economics**

43.100, Principles of Economics

### **Engineering**

95.100, Basic Computer Programming

### **English**

18.100, English Authors from Chaucer to T. S. Eliot

18.101, English and Continental Texts: Dante to T. S. Eliot

18.102, Form and Tradition

18.162, Twentieth-Century Literature<sup>(1)</sup>

18.309, Greek and Latin Literary Genres<sup>(2)</sup>

### **French**

20.010, Readings in Modern French<sup>(2)</sup>

20.100, French Literature from La Chanson de Roland to Zola<sup>(1)</sup>

20.101, French Literature from the Middle Ages to Modern Times

20.102, French Literature, Modern Authors

20.110, Cours de langue française

### **Geography**

45.101, The Geographic Web

45.210, Physical Geography

45.230, Cultural Geography

### **Geology**

67.100, General Geology

67.235, Palaeontology and Stratigraphy I<sup>(2)</sup>

### **German**

22.015, Elementary German

22.016, Deutsch I (a direct method course for beginners)

22.100, Intermediate German A

22.101, Intermediate German B

22.201\*, Intermediate Conversation

22.202\*, Intermediate Composition

22.250, German Literature of the 18th Century<sup>(2)</sup>

22.281, German Poetry and Drama of the 20th Century<sup>(2)</sup>

### **Greek**

15.015, Introduction to Language and Reading

15.100, Literature and Reading

### **History**

24.112, European Civilization in Modern Times

24.115, Civilization during the Middle Ages

<sup>(1)</sup>For major and honours students

<sup>(2)</sup>May be taken with special departmental approval

## **Arts**

### **Humanities**

10.100, An Examination of Selected Works from Biblical Times to the Present

### **Italian**

26.015, Introduction to Italian

26.100, Intermediate Italian

### **Journalism**

28.100, Introduction to Mass Communications (enrolment limited)

### **Latin**

16.100, Literature and Reading

16.110, Latin Literature

### **Mathematics**

69.100, Introductory Calculus and Algebra<sup>(1)</sup>

69.101, Introductory Mathematics

69.130, General Mathematics

### **Music**

30.100, Introduction to the Music of Western Civilization

30.160, Materials and Techniques of Music

### **Philosophy**

32.100, Introduction to Philosophy: Religion, Ethics and Inference

32.105, Introduction to Philosophy: Philosophical Texts

32.110, Introduction to Philosophy: Knowledge and Logic

32.120, Introduction to Philosophy: Reason and Argument

### **Physics**

75.010, Pre-University Physics

75.100, Introductory Physics

75.105, Introductory Physics (for non-majors)

### **Political Science**

47.100, Introduction to Political Science

### **Psychology**

49.100, Introductory Psychology

49.205\*, Introduction to Psychological Statistics

49.206\* or 49.207\* in second term, if 49.205\* successfully completed

49.260\*, Introduction to the Study of Personality (second term if registered in 49.100)

49.301\*, Precursors of Psychology

49.321\*, Perception (if registered in 49.100)

### **Religion**

34.100, Introduction to World Religions

34.120, Origin and Early Development of Judaism and Christianity

### **Russian**

36.015, Introductory Russian

36.100, Intermediate Russian

36.201\*, Conversation and Composition

### **Science**

60.100, A Course in the Methodology of Science for Students in Arts

<sup>(1)</sup>For major and honours students

## **Arts**

### **Sociology**

- 53.100, Introduction to Sociology: General Survey of the Fields of Sociology
- 53.101, Social Issues: the Secular Society, Processes of Modernization

### **Spanish**

- 38.015, Introductory Spanish
- 06.132, Intensive Introductory Spanish
- 38.100, Intermediate Spanish
- 38.101, Intensive Intermediate Spanish<sup>o1</sup>

### **Ukrainian**

- 36.016, Introductory Ukrainian (offered in Department of Russian)

NOTE: With special departmental approval, the following departments will allow first-year students to take certain courses numbered 200 and above: Art, French, German, Greek, History, Italian, Latin, Russian and Spanish.

### *Second and Third Years*

A total of ten courses, five in each year: a minimum of four of these to be in the student's major (five, if one is not taken in First year). The others are to be chosen with the approval of the major departments.

### **Bachelor of Arts with Honours**

The degree of Bachelor of Arts with Honours is designed for students who wish more rigorous and extensive studies in their chosen discipline. The honours degree is essential as a qualification in certain fields of employment and is the essential or most desirable preparation for those intending to pursue graduate studies or professional training. The programs of studies in Honours are carefully prescribed and are given close supervision by the departments responsible for the major subjects or fields of study. The student in Honours must show competence in independent work and in small groups. Opportunity is provided for the student to read widely beyond as well as within his particular field of honours study.

### *Additional Admission Requirements*

Admission to Honours will be granted only with the consent of the department in which the major subject is taken and with the approval of the Committee on Honours. Students with at least a 65% average in Senior Matriculation or equivalent or 4.0 grade point average in the Carleton Qualifying University year may be enrolled in Honours in the First year. With the permission of the department concerned, such students may take six courses as prescribed under the separate Divisions below. (See p. 13 for general regulations on Honours Standing).

Length of Course. Candidates for a degree with Honours will ordinarily take a minimum of twenty-four courses in five years if admitted by Junior Matriculation, or a minimum of nineteen courses in four years if admitted by Senior Matriculation. With the permission of the department or departments concerned, it is possible for a candidate of exceptional ability to complete an honours program in certain fields in three years from Senior Matriculation by taking six courses in each winter session and one in each of the summers (if necessary, completing a graduation essay or thesis where required in the summer of the graduating year).

Course Selection. A candidate for Honours must choose a major subject or an approved combination of subjects, normally before entry to the Second year. Details of honours courses may be found below under the respective departmental programs.

<sup>o1</sup>For major and honours students

Students wishing to qualify for entry to the Ontario College of Education in the course leading to the High School Assistant's Certificate Type A should consult the Registrar and the appropriate department regarding course selection.

### *Programs of Study*

#### 1) Honours programs in the Humanities

At present Honours are available in Classics, English, French, German, History, Mathematics, Music, Philosophy, Religion, Russian, and Spanish. Certain programs of combined honours may be arranged by permission of the departments concerned. The First year Honours prescription consists of the First year of the B.A. degree program, with the option of a sixth course to be chosen in consultation with the department concerned.

#### 2) Honours programs in the Social Sciences

At present Honours are available in Anthropology, Economics, Geography, History, Mathematics, Political Science, Psychology, Public Administration, and Sociology. Combined honours programs are also available.

#### 3) Honours program in Soviet and East European Studies (this is fully described on pp. 43-45).

An honours program in Commerce, leading to the degree of Bachelor of Commerce with Honours is also available. (For a description of this program see p. 29).

An honours program in Journalism, leading to the degree of Bachelor of Journalism with Honours, is also available. (For a description of this program see p. 33).



# School of Commerce

Director of the School: T. N. Brewis (Economics)

Committee of Management:

G. C. Merrill, Associate Dean, Division II, Faculty of Arts

R. D. Abbott (Law)

R. Caterina (Accounting)

C. L. Johnson (Economics)

G. Paquet (Economics)

W. R. Scott (Accounting)

D. Belyea (Student Representative)

J. H. Prenger (Student Representative)

## Bachelor of Commerce

The Bachelor of Commerce degree is an honours program and candidates are required to complete a four year course of studies after Senior Matriculation.

The Commerce program is designed to provide a broad foundation in academic disciplines underlying business and economic affairs in general, and to permit a measure of concentration in one of the following fields: Economics, Accounting and Finance, Quantitative Methods, or Labour and Industrial Relations.

(See p. 13, Entry to Honours programs).

The program is offered in the evening as well as the day but each student must spend a minimum of one year as a full-time student in the day division.

### *Admission Requirements*

To the *Qualifying University* year:

The same as required for admission to the Bachelor of Arts degree (see p. 21).

To the *First year*:

Completion of Qualifying University year with a grade point average of 4.0 or better, or an average of 65% or better in Grade 13 in the following subjects:

1. English
2. A language other than English
3. Mathematics (both papers) or the equivalent
4. One option chosen from:

History

Geography

A second language

A science

The above requirements apply to students who take Grade 13 in one year; students spending two years in Grade 13 must present *five* subjects.

Applicants from other provinces must present acceptable equivalent certificates generally required for admission to universities in their own provinces.

All applicants will be required to present the results of the Scholastic Aptitude Tests (verbal and mathematical) of the Service for Admission to College and University or the College Entrance examination Board.

### *Second and Later Years:*

Applications for admission to the Second or later years will be governed by the arts requirements as stated on p. 22. Advanced standing for studies undertaken elsewhere will be granted only for those subjects which are recognized as the equivalent of subjects offered at Carleton University.



## Commerce

### Course Requirements

Length of course. Candidates for the Bachelor of Commerce degree must take a total of 25 courses after Junior Matriculation or 20 after Senior Matriculation, selecting one of the fields of concentration listed below. See also Course Load, p. 7.

Course Selection. Courses will be selected from those listed under Details of Courses, p. 79, as follows:

### Qualifying University Year

1. English 18.010
2. French 20.010 or a course numbered between 010 and 099 in another language
3. Mathematics 69.010
4. A science: Chemistry 65.010, Physics 75.010, Geology 67.100, or Science 60.100
5. History 24.014, or another language, or another science

### First Year

1. Economics 43.100
2. Accounting 41.100
3. Mathematics 69.100 or 69.101
4. Two options

### Second to Fourth Years

#### Fields of Concentration

Economics	Accounting and Finance	Quantitative Methods	Labour and Industrial Relations
II Economics 43.200 or 43.210	Economics 43.200 or 43.210	Economics 43.200 or 43.210	Economics 43.200 or 43.210
Economics 43.220	Economics 43.220	Economics 43.220 <sup>(1)</sup>	Economics 43.220
Accounting 41.200	Accounting 41.200	Accounting 41.200	Accounting 41.200
A course in law	Law 51.220	Mathematics 69.201	Sociology 53.100
One approved option	One approved option	or Mathematics 69.205* and 69.245*	One approved option
One approved option		One approved option	
III Economics 43.200 or 43.210	Economics 43.200 or 43.210	Economics 43.200 or 43.210	Economics 43.200 or 43.210
Economics 43.305 or 43.315 or 43.325	Economics 43.305 or 43.315 or 43.325	Economics 43.305 or 43.315 or 43.325	Economics 43.305 or 43.315 or 43.325
One additional course in Economics	Accounting 41.340	Accounting 41.365	Sociology 53.360
Two approved options	Accounting 41.365 or any two of Accounting 41.301*, 41.306*, 41.325*, 41.326*.	A course in law	Two courses to be chosen from:
	One approved option	One approved option	Accounting 41.365
			Sociology 53.245 or 53.246
			Psychology 49.340
			Psychology 49.210* and Psychology 49.211*
			One approved option

<sup>(1)</sup>With permission, a student may take a course in statistics in the Mathematics department in lieu of Economics 43.220, if he is taking the Quantitative Methods field.

IV One category 4	Economics 43.410	Economics 43.485	One category 4
Economics	Accounting 41.400	Economics 43.405	Economics
course	Economics 43.350	One approved	course
A further	Two approved	course in	Two of Economics
course in	options	Mathematics	43.356*, 43.357*,
Economics at		Two approved	43.358*
the 400 level.		options <sup>(1)</sup>	Law 51.441
Three approved			Two approved
options.			options of which
			one must be in
			Sociology

Each student in Commerce IV must take at least one 400-level course involving a substantial research paper.

<sup>(1)</sup>With permission a senior undergraduate may take Economics 43.575 (Mathematical Economics).

A minimum of four courses outside the Departments of Economics and Accounting, Mathematics, and Law must be taken in the Faculty of Arts before graduation. Of these not more than three may be at the 100 level. At least one must be in Political Science, Sociology or Psychology.

Students who, after achieving the Bachelor of Commerce degree, intend to proceed to professional accounting qualifications—Chartered Accountant (C.A.), Certified General Accountant (C.G.A.), or Registered Industrial and Cost Accountant (R.I.A.)—should consult one of the Professors of Accounting before entering the Third year of the Commerce course.

### *Standing*

In addition to obtaining the grades required in the general regulations (p. 8) students entering Second year must achieve C or better in each of Accounting 41.100 and Economics 43.100. To proceed into subsequent years and qualify for graduation students must each year obtain C or better in each of two honours courses.

In addition, candidates must be recommended for graduation by the School of Commerce.

Students who fail to meet the standards required for entry to an honours program may elect to take their first year in Pass Arts, and subject to satisfactory grades in that year apply for entry into the second year of the Commerce program.



# School of Journalism

Director of the School: T. Joseph Scanlon, B.J., D.P.A., M.A.

## *Advisory Council*

T. J. Allard, Executive Vice-President, Canadian Association of Broadcasters

Marcel Gingras, Rédacteur en chef, *Le Droit*, Ottawa

Guy de Merlis, Department of Labour

I. Norman Smith, Vice-President and Editor, *The Ottawa Journal*

Christopher Young, Editor, *The Ottawa Citizen*

Martin Goodman, Managing Editor, *Toronto Daily Star*

Gordon Pape, Associate Editor, *Montreal Gazette*

Stuart Griffiths, Vice-President and Managing Director, *CJOH-TV* Ottawa

Davidson Dunton, President of the University

T. Joseph Scanlon, Director of the School

A. Trevor Tolley, Director, Division I, Faculty of Arts

Registrar of the University

## **Bachelor of Journalism**

The Bachelor of Journalism degree is an honours program and candidates are required to complete a four year course of studies after Senior Matriculation.

Qualifying and First year is offered in both the day and evening divisions; the remaining years are offered mainly in the day division.

There is also a one-year course for university graduates.

The place of the journalist in society has been profoundly affected by the events of recent decades. The revolution in communication and transportation has enormously extended the reach of every community. The rise in literacy and the extension of democratic government has greatly increased the potential audience. The increasing complexity of life demands a more sophisticated approach to reporting and editing. More 'depth' reporting, more explanation, and more interpretation are required. The new media enrich the possibilities for vivid and effective reporting. All these changes emphasize the rising importance of the reporter, who must serve as "eyes and ears of the world".

The new age of technology needs technicians and technologists to serve it. Without them the reporter and editor will be ineffective. But the primary task of the journalist is another matter. What is wanted today is the skilled investigator, the intelligent interpreter, and the able communicator, in any medium. The world of journalism needs a constant flow of honest and alert young people with wide interests and a zest to find out what is going on in the world. These young people require a first-rate education, coupled with sufficient training in the primary skills to enable them to move easily and effectively into the various regions of modern journalism.

For these reasons the courses in Journalism at Carleton University emphasize liberal scholarship and basic skills. We assume that there are few practical applications of a specialized nature which cannot be subsequently acquired in a few weeks of actual work. While an array of "shop" courses in practical vocational training might appear to give more immediately useful crafts to the prospective journalist, it is contended that no amount of "shop" training will carry a "cub" far if he lacks a broad background of liberal education and the intelligence to grasp and report the complex phenomena of modern society.

The opportunities in the national capital for the training of newspapermen and women are exceptional. The members of the parliamentary press gallery and staffs of the

## Journalism

Ottawa news media, the press attachés of diplomatic missions, top executives in the field of broadcasting, the public information officers of government departments, and headquarters personnel of national associations are among the resources from which Carleton University can draw for guest lecturers and teaching material. Ottawa is a repository and bureau of information upon almost every conceivable national and international topic. Residence in the national capital can of itself be an education to anyone who plans to make journalism his or her career.

### *Admission Requirements*

To the Qualifying University year of the course leading to the Bachelor of Journalism degree:

Requirements are the same as those for admission to the Qualifying University year of courses leading to the Bachelor of Arts degree (see p. 21).

To the First year of the course leading to the Bachelor of Journalism degree:

- a) Completion of Qualifying University year with an average of C, or
- b) Ontario Grade 13, or an equivalent certificate, with a 65% general average in the following subjects:

1. English Composition and Literature.
2. A language other than English.
- 3., 4. Two options, chosen from History, Geography, a second language, a science, or Mathematics A or Mathematics A and B or two or three of Algebra, Geometry, Trigonometry. (Any offering or combination of offerings in Mathematics will count only as one option.)

Students who are registered in Ontario Grade 13 for more than one year must present *five* subjects for admission.

All applicants will be required to present the results of the Scholastic Aptitude Tests (verbal and mathematical) of the Service for Admission to College and University or the College Entrance Examination Board.

- c) To the Second and Third years of the course leading to the Bachelor of Journalism degree:

Undergraduates applying for admission to advanced standing with allowances on credits gained at their original college or university may be admitted to the Second year, if their academic record is accepted as at least equivalent to the completion of the First year of Journalism in Carleton University. Normally, such applicants should offer standing in at least two of the following subjects in their previous work: Canadian History, Psychology, Economics, Political Science. Credit for courses previously taken will be arranged on application.

*Note:* Journalism students are urged to become reasonably proficient on the typewriter as soon as possible. All assignments in the professional journalism courses will be done by typewriter.

### *Course Requirements*

**Length of Course.** Candidates for the Bachelor of Journalism degree must take a total of twenty-six courses in five years if admitted by Junior Matriculation, or twenty-one courses in four years if admitted by Senior Matriculation.

**Course Selection.** The course leading to the degree of Bachelor of Journalism will consist of subjects selected from those listed under Details of Courses, as follows:

### *Qualifying University Year*

1. English 18.010 (English Literature and Composition).
  2. French 20.010 (Readings in Modern French).
- or a course numbered between 010 and 099 in another language.



3. Mathematics 69.010.  
or Latin 16.010 or another approved language course.
4. A science: Biology 61.100 or Chemistry 65.010 or Physics 75.010 or Geology 67.100 or Science 60.100.
5. History 24.014 (Main Directions in Modern History).

#### *First Year*

1. Journalism 28.100 (Introduction to Mass Communications).  
Journalism 28.101\* (Non-credit workshop).
2. English 18.100, 18.101, 18.102 or 18.162.
3. A further language course, preferably French.
4. An approved course in History.
5. Philosophy 32.100, 32.105, 32.110, 32.120 or Humanities 10.100 or Religion 34.100.

#### *Second Year*

1. Journalism 28.200 (Problems of the Mass Media).
2. Journalism 28.220 (Fundamentals of Reporting).
3. An approved course in Canadian History; normally History 24.230.<sup>(1)</sup>
4. An introduction to the study of society: one of:
  - Anthropology 54.100
  - Economics 43.100
  - Political Science 47.100, 47.101
  - Psychology 49.100
  - Sociology 53.100, 53.101, 53.102
5. An approved option.

#### *Third Year*

1. Journalism 28.300 (The Modern Environment).
2. Journalism 28.320 (Interpretative Reporting and Editing).
3. Journalism 38.321\* (Career Seminars).  
An approved option.
4. An approved option.<sup>(2)</sup>
5. An approved option.<sup>(2)</sup>

#### *Fourth Year*

1. Journalism 28.490 (Honours Tutorial).
2. Journalism 28.498 (Honours Research).
3. Journalism 28.400 (Basic Issues)  
or  
An approved option.<sup>(2) (3)</sup>
4. An approved option.<sup>(2) (3)</sup>
5. An approved option.<sup>(2) (3)</sup>

#### *Standing*

A candidate for the degree of Bachelor of Journalism with Honours must have at least C level standing in his Journalism courses, and be recommended for graduation by the School of Journalism. If after the regular examinations in any year a student is below that standard, he is advised to raise his grades in some subjects by

<sup>(1)</sup>Students who propose to practice Journalism in another country may be advised to choose a different History course.

<sup>(2)</sup>These options must be continuing courses in fields already begun.

<sup>(3)</sup>An honours student must take at least four courses in a field other than Journalism. One of these courses must be at the third level or equivalent or higher.



## **Journalism**

writing special supplemental examinations. Students may not continue into Third year without satisfactory standing.

Students in Honours may also combine some specialized area of study such as any field in Arts or Commerce, Engineering or Science with the basic Journalism program in order to prepare themselves for writing or editing in a specialized area.

Students who enter Carleton in the First year of any faculty other than Journalism (Science or Engineering) may be admitted to the Second year Honours in Journalism, provided they have at least a B— overall average in First year (or equivalent). These students may proceed to a Bachelor of Journalism with Honours degree by taking the six courses in Journalism required of honours students and combining these with courses in their initial field of study approved by the School of Journalism in consultation with their other department or faculty.

### **Graduate Division**

The holder of a Bachelor's or Master's degree in Arts, Science, or Commerce may be permitted to enroll in the Graduate Division of the School of Journalism and, if his or her background has reached the required standard, may qualify for the degree of Bachelor of Journalism with Honours in one academic year of five courses. If the background is insufficient in the social sciences or humanities, one or more additional credits may be required for the degree.

The one-year program will normally consist of the following five subjects:

1. Journalism 28.401\* (Perspectives on Modern Society).  
Journalism 28.402\* (Basic Issues in Canada).
2. Journalism 28.410 (The Press in Modern Society).
3. Journalism 28.430 (Editorial Practice and Policy).
4. Journalism 28.440 (Modern News Reporting).
5. Journalism 28.499 (Research Credit).

Students in the Graduate Division will normally take part in the workshop sessions in Journalism 28.350. Arrangements will be made for apprenticeship assignments to supplement such practical experience as graduate students may already possess. Please note the reference above to proficiency in typewriting, and the paragraph relating to standing and grades. A grade of C— or higher must be obtained in each of the five courses required in the one-year program for graduates.

# School of Public Administration

Director of the School:

R. Oliver MacFarlane, M.A., PH.D.

## *Advisory Council*

R. D. Boyd, Director, Personnel Branch, Department of Veteran Affairs

R. B. Bryce, Deputy Minister, Department of Finance

G. F. Davidson, President, Canadian Broadcasting Corporation

J. Y. Harcourt, University Liaison Officer, Public Service Commission

E. F. Sheffield, Executive Vice-Chairman, Committee of Presidents of Provincially Assisted Universities and Colleges of Ontario

Davidson Dunton, President of the University

A. Trevor Tolley, Director, Division I, Faculty of Arts

Gordon C. Merrill, Associate Dean, Division II, Faculty of Arts

R. Oliver MacFarlane, Director of the School

Donald C. Rowat, Professor of Political Science

Registrar of the University

## *The Program*

The rapid growth in government services during the last half century has increased the responsibilities and complicated the problems of public employees. The realization has been growing, therefore, that public administrators, whether federal, provincial, or municipal, can profit from a special type of education. Carleton University has been attempting to meet this need by offering programs of study as preparation for public administration.

Assisted by a \$200,000 grant from The Atkinson Charitable Foundation, the School of Public Administration was established September 1, 1953, to co-ordinate the various programs of study and to promote further development and research in the field. Four programs are now offered: the first leads to a Bachelor of Arts with Honours in Public Administration; the second to an undergraduate Certificate in Public Services Studies; the third to a graduate Diploma in Public Administration; and the fourth to the degree of Master of Arts in Public Administration.

The Honours B.A. program is planned on the assumption that the most suitable education for a person desiring to be a capable public administrator is broad and general in base, with specialization at a later stage. While it is designed to be of particular use to students contemplating careers in public employment, it also provides a sound general education for those considering the legal profession or business.

The Certificate and Diploma programs, on the other hand, will be most helpful to those who desire training in fields directly related to public administration. The Certificate course is designed to encourage public servants without university training to broaden their background. Since they are allowed degree credit for this work, they will also be encouraged, upon its completion, to continue toward a bachelor's degree. The graduate Diploma course, requiring more advanced studies, is available both to public servants in the evening division and to full-time day students. The M.A. program is offered to full-time students, but may be taken by part-time students, subject to conditions set forth on p. 41. Some teaching fellowships are available for M.A. candidates.

Public employees not interested in registering for studies leading to a degree, a certificate, or a diploma should note that they may take, as *special* students, any of

## Public Administration

the subjects listed in Public Administration programs for which they have the requisite background. Their attention is directed also to non-credit extension courses related to Public Administration which are offered from time to time by the University. Details may be obtained from the Office of the Registrar.

As Carleton University is located in the capital city and enjoys close relations with many government agencies, students of public administration may profit greatly from the unique advantages thus offered. Such institutions as the Library of Parliament, The National Library, the Public Archives, the Dominion Bureau of Statistics, and the specialized libraries of the several government departments, all offer unusual opportunities for study in Ottawa. Advice and assistance are obtained from the Public Service Commission and from officials of other government departments and agencies. Experienced public administrators give lectures or lead seminar discussions from time to time.

### *Undergraduate Courses*

**Bachelor of Arts with Honours in Public Administration** (Qualifying and First years offered in both day and evening divisions; last three years offered in day division only.)

### *Course Requirements*

Candidates for the degree of Bachelor of Arts with Honours in Public Administration must satisfy all requirements for the degree of B.A. with Honours.

Course Selection. The work of this course involves prescribed studies in Political Science, History, Economics, and Law, and in approved options, as outlined below.

### *First Year*

Students intending to enter Honours Public Administration in the Second year will take the Honours First year in the Social Sciences (see p. 27), or they may enter from the Pass course if at least second class standing has been obtained. They are advised, however, to include an introductory course in Political Science in the First year, and by the end of that year should have a reading knowledge of French.

### *Second Year*

1. Political Science 47.210, 47.310 or 47.220
2. Economics 43.100 (Principles) or, if already taken, an option
3. History 24.230 (Canada from 1763)
4. Political Science 47.230 (History of Political Thought)
5. An approved option

### *Third Year*

1. Political Science 47.340 (Public Administration)
2. Political Science 47.300 (Canadian Government and Politics)  
or Law 51.450 (Canadian Constitutional Law)
3. Law 51.300 (Legal Process)  
or Law 51.305 (Introduction to Public Law)  
or Political Science 47.260 (International Politics)
4. Economics 43.210 (Aggregate Economic Theory and Policy)  
or Economics 43.325 (Economic Development of Canada)  
or Economics 43.220 (Statistics)
5. An approved option

*Fourth Year*

1. Political Science 47.400 (Government of Canada)
2. Political Science 47.490 (Research Tutorial)  
or Political Science 47.498 (Honours Graduation Essay)
- 3 & 4. Two of the following:
  - Accounting 41.340 (Government Accounting & Finance)
  - Economics 43.440 (Public Finance)
  - Political Science 47.430 (Modern Political Thought)
  - Political Science 47.440 (Personnel Administration)
  - Sociology 53.245 (Sociology of Work)
  - Sociology 53.345\* (Power and Stratification) *and*
  - Sociology 53.352\* (Political Behaviour)
5. An approved option.

**Certificate in Public Service Studies** (Offered in both day and evening divisions). This course is designed primarily for public employees who seek special training in public service subjects at the undergraduate level. Subjects taken for the Certificate may be credited toward a bachelor's degree, but a student must complete at least five of the subjects required for the degree after the award of the Certificate. Candidates for the Certificate, full-time, are invited to inquire about possible financial aid.

*Admission Requirements*

Junior Matriculation; but the cases of experienced applicants without Junior Matriculation will be considered on their merits and the completion of certain subjects at Carleton may be required before admission. Candidates may be admitted with advanced standing, but must complete at least five courses for the Certificate in Carleton University.

*Course Requirements*

The following courses are required and the following order is suggested.

1. An Introductory Course in Political Science
2. Economics 43.100 (Principles of Economics).
3. History 24.230 (Canada from 1763)  
or History 43.325 (The Economic Development of Canada)
4. Political Science 47.340 (Public Administration)
5. Political Science 47.300 (Canadian Government and Politics)  
or Law 51.300 (Legal Process) or Law 51.305 (Introduction to Public Law)
6. One other chosen in consultation with the Director according to the needs of the student.

Standing. A candidate for the Certificate must obtain a grade of C or better in at least half of the courses taken in Carleton University for the Certificate.

*Discontinued Programs*

Bachelor of Public Administration

Bachelor of Arts with Certificate in Public Administration.

**Graduate Courses**

*Graduate Diploma in Public Administration* (Offered in both day and evening divisions).

This course is designed for those in or planning to enter the public service who already have a university degree, but desire further training in the fields directly related to public administration.



## Public Administration

### *Admission Requirements*

A bachelor's degree from a recognized college or university, including (with better than average standing) the following undergraduate courses, or their equivalents:

- a. Political Science 47.100 (Introduction to Political Science)
- b. Economics 43.100 (Principles of Economics)
- c. History 24.230 or 43.325 (Canadian History)
- d. Two other courses approved by the Director, in the social sciences or related fields. Experiences in public service may be accepted in lieu of one of these two courses.

An applicant who lacks one or more of these prerequisite courses may be allowed to take one as No. 5 of the course requirements, and may make up the remainder of his deficiencies at the University. Ordinarily he would not be required to take more than two courses in addition to the requirements for the Diploma. A prospective full-time student with only one or two prerequisites to make up may be permitted to take one as an additional course during his full-time year.

### *Course Requirements*

Five courses are required:

1. Political Science 47.340 (Public Administration)
2. Political Science 47.230 or 47.430 (Political Thought)
3. Political Science 47.400 (Government of Canada)  
or Political Science 47.300 (Canadian Government and Politics)
4. Law 51.300 (Legal Process)  
or Law 51.305 (Introduction to Public Law)  
or Law 51.450 (Canadian Constitutional Law)  
or Political Science 47.440 (Personnel Administration)  
or Accounting 41.340 (Government Accounting and Finance)
5. An approved social science, preferably chosen from: Economics 43.220, 43.430, 43.440, Law 51.300, 51.305, 51.450, 51.555, Sociology 53.345\* and 53.350\*, 53.440\* and 53.441\*, Psychology 49.340, Accounting 41.340, or the courses in Political Science.

At least one of the courses for the Diploma must be a seminar.

All five courses for the Diploma must be taken at the University. If a student has already taken one of these courses (or their equivalents) in qualifying for admission to the Diploma program, he must substitute others approved by the Director. To meet the needs of foreign students, variations from the course requirements may be approved by the Director.

Potential Municipal Administrators should elect the following program:

1. Political Science 47.340 (Administration)
2. Political Science 47.230 or 47.430 (Theory)
3. Political Science 47.490 (Tutorial in Local Government)  
or Political Science 47.498 (Research Essay)
4. Political Science 47.500 (Provincial and Municipal)
5. Law 51.300 (Legal Process)  
or Law 51.305 (Introduction to Public Law)  
or Law 51.474 (Local Government Law)  
or Political Science 47.440 (Personnel Administration)  
or Accounting 41.340 (Government Accounting and Finance)  
or Geography 45.420 (Urban)

Standing. All grades must be C, or better, with a grade point average in the five required courses of 6.2.

*Master of Arts in Public Administration*

This program is normally offered in Day Division only, but it may be taken in Evening Division with the approval of the Director under the following conditions:

1. Admission under 'a' or 'b' below.
2. Passing a comprehensive examination prior to the conferring of a degree.
3. Completing all requirements in a period not exceeding five years.
4. Having previously competed in B.A. or graduate program at least one year of university residence.

*Admission Requirements*

a. A bachelor's degree, and the graduate Diploma in Public Administration with a grade point average of 7.2 or better, and no course below C.  
or

b. A bachelor's degree in any honours course requiring four years from Senior Matriculation with second-class honours or better, or a bachelor's degree and an additional year of post-graduate work with at least second-class standing. If standing has not been obtained in Introduction to Political Science, Economic Principles, Canadian History, Public Administration, and Political Theory, a student will be required to complete some or all of these courses with grades of B or better, prior to undertaking the course requirements listed below. A prospective full-time student with only one or two prerequisite courses to make up, may take one of these during the summer prior to entry and/or may be permitted to audit or take one as an additional course during his full-time year.

If a student is without standing in all or most of these courses he will be required to register for the Graduate Diploma. An evening student may then, upon successful completion of three of the above courses with grades of B or better, apply for admission to the M.A. program. (A full-time student in this category would be allowed to choose his Diploma courses so that one or two of them could count toward his M.A. Upon the successful completion of his full-time year, he could then either take the Diploma or apply for admission with advanced standing to the M.A. program, which could then be completed in the Evening Division.)

*Course Requirements*

1. Political Science 47.540 (Theory and Practice of Administration)  
or Political Science 47.545 (Comparative Public Administration)
2. Law 51.555 (Administrative) (This course must be elected if not previously taken.)  
or Political Science 47.440 (Personnel Administration)
3. Political Science 47.400 (Government of Canada)  
or Political Science 47.500\* (Canadian Municipal Government) and  
    either Political Science 47.501\* (Provincial Government)  
    or Political Science 47.502\* (Comparative Local Government)  
or Political Science 47.510 (The Political Process in Canada)  
or Political Science 47.503 (Problems in Canadian Government)
4. (a) An approved option, and either  
Political Science 47.590 (Directed Study in a Selected Field)  
or Political Science 47.598 (Research Essay)  
or (b) Political Science 47.599 (Thesis, equivalent to 2 courses)

Standing. A grade of B or better must be obtained in each course counted for the M.A. degree, with a grade point average of 7.5. All students must pass an oral examination.

*Doctor of Philosophy*

See program outlined under Political Science, and note language requirement.





# Soviet and East European Studies

Director: Bohdan R. Bociurkiw (Political Science)

## *Committee*

A. Trevor Tolley, Director, Division I, Faculty of Arts  
Gordon C. Merrill, Associate Dean, Division II, Faculty of Arts  
Glynn R. Barratt (Russian)  
Adam Bromke (Political Science)  
Richard L. Carson (Economics)  
R. Carter Elwood (History)  
Teresa R. Harmstone (Political Science)  
Dale T. LaBelle (History)  
Carl M. McMillan (Economics)  
George Melnikov (Russian)  
George Roseme (Political Science)  
Emilie Stichling (Russian)  
John W. Strong (History)  
Philip E. Uren (Geography)  
Paul Varnai (Russian)

## *Associates*

Mr. A. M. Baldwin — Department of Trade and Commerce  
Dr. Constantine Bida — University of Ottawa  
Mr. Ivor Bowen — Ottawa  
Dr. Stanley Haidasz — House of Commons  
Dr. Godfrey Hearn — Department of External Affairs  
Dr. T. P. Jost — University of Ottawa  
Dr. Vladimir J. Kaye — Ottawa  
Mr. J. B. Seaborn — Department of External Affairs  
The Hon. Paul Yuzyk — The Senate  
Mr. Lubor Zink — Ottawa

The expanding public interest in the USSR and East Europe, as well as the growing demand for specialists in this area in public service, foreign trade, journalism and teaching, led in 1963 to the establishment of an interdepartmental committee to foster Soviet and East European studies at Carleton University. The proximity of the University to several government libraries with a wealth of material relating to the USSR and East Europe and the presence of embassies of these countries in Ottawa make Carleton a suitable centre for instruction and research in this field.

The Committee, composed of representatives of five departments in the humanities and social sciences, offers an Honours degree program in Soviet and East European Studies and also sponsors public lectures, conferences, seminars, and extension courses relating to the Soviet Union and the Eastern European countries, and promotes exchanges with universities in the USSR and East Europe.

The program of Soviet and East European Studies works in close association with Carleton's School of International Affairs on problems of East-West Relations.

Under an academic exchange agreement between Carleton and the University of Leningrad, graduates with an honours degree in Soviet Studies are eligible to apply for nine months of study in the Soviet Union.

## *Honours Program*

The objective of the Honours program is to equip students with the indispensable linguistic tools and to provide, through an interdisciplinary approach, an integrated

## Soviet and East European Studies

knowledge of the cultures, historical developments and contemporary social, economic and political problems of the people of the area. The program leads to the degree of Bachelor of Arts with Honours in Soviet and East European studies.

A combined Honours degree between Soviet and East European Studies and the School of Journalism is offered to interested students. Course requirements for this degree are planned by the Director of the program in consultation with the Director of the School of Journalism, and are designed to accommodate the students' interests and needs.

### *Admission Requirements*

Admission to the program must be approved by the Committee on Soviet and East European Studies and by the Faculty of Arts Committee on Honours. Students with at least a 65% average in Senior matriculation or a C standing in the Carleton Qualifying University year, may be enrolled in the program in the First year. With the consent of the Committee, students may also enter the program in their later years, providing they have maintained honours standing and have completed the program's course requirements to that point.

### *Course Requirements*

Candidates for a degree in Soviet and East European studies will take twenty courses. Course requirements for the honours degree are as follows:

- a) All candidates will be required to take the equivalent of three full courses in the Russian language. The courses selected will depend on the candidate's language ability and are to be chosen in consultation with the Director.
- b) Four courses at either the 100-level or at a higher level if designated by the department as being open to First year students. These four courses should be selected as preparation for later study in Soviet and East European area courses offered by the program. A student's First year course pattern is to be selected in consultation with the Director.
- c) Six or seven courses (given in no less than three different departments) are to be selected from among the following:

Russian Grammar (Russian 36.203\*)

Russian Literature of the Nineteenth Century (Russian 36.250)

Russian Literature in Translation (Russian 36.260)

Advanced Oral Russian (Russian 36.301\*)

Advanced Russian Composition (Russian 36.302\*)

Russian Poetry (Russian 36.320)

Russian Drama (Russian 36.340)

Russian Literature up to Pushkin (Russian 36.360)

History of the Russian Language (Russian 36.415\*)

Russian Prose of the Nineteenth Century (Russian 36.430)

Soviet Russian Literature (Russian 36.450)

Russian Tutorial (Russian 36.491)

Introductory Ukrainian (Ukrainian 36.016)

Soviet Union (Geography 45.360\*)

East Europe (Geography 45.361\*)

History of Russia and the USSR (History 24.260)

History of the USSR (History 24.360)

History of Eastern Europe (History 24.365)

Selected Problems in Russian History (History 24.460)

\*Indicates half courses.

Selected Problems in Soviet History (History 24.461)  
Economics of Planning (Economics 43.366\*)  
The Economics of Socialism (Economics 43.370)  
Comparative Economic Systems (Economics 43.470)  
Soviet Government and Politics (Political Science 47.320)  
Politics and Literature (Political Science 47.330\*)  
Modern Political Thought and Ideology (Political Science 47.333)  
Problems in Communist Politics (Political Science 47.515)  
Soviet-American Relations (Political Science 47.570)

*Note:* Not all courses listed above are offered in any given year and not all combinations of courses are possible.

d) Five additional courses are to be selected in consultation with the Director of the program from the offerings of the Departments of Economics, Geography, History, Russian, and Political Science.

e) A graduating essay to be written in one of the participating departments (to be written in the Fourth year). This essay may carry the weight of either one or two courses depending upon the regulations of the department selected.

### *Standing*

Students must maintain honours standing as prescribed by the general requirements.

### *Announcement*

During the academic year 1969-1970 it is proposed that the Soviet Studies Program be transformed into an Institute of Soviet and East European Studies. It is proposed that the Institute will supervise and develop the current B.A. Honours Program, promote research, and plan a future program of graduate studies.

\*Indicates half courses.



# Comparative Literature

Chairman of the Committee: Wladimir Kryszinski

Assistant Professor: Hans-George Ruprecht

## Committee:

Moray St. John Macphail, Dean of the Faculty of Graduate Studies

A. Trevor Tolley, Director, Division I, Faculty of Arts

Glynn R. Barratt (Russian)

David George Beer (Classics)

Jutta Goheen (German)

John J. Healy (English)

Thomas Henighan (English) (on leave of absence, 1969-70)

Benjamin W. Jones (English)

Eva Kushner (French) (on leave of absence, 1969-70)

Pierre Laurette (French)

Christopher Levenson (English)

Robert L. McDougall (Institute of Canadian Studies)

Christopher Marsden (Spanish)

George Melnikov (Russian)

Ernst Oppenheimer (German)

James S. Tassie (French)

Fernando de Toro-Garland (Spanish)

The purpose of Comparative Literature is to study literature in its international context, and to relate and compare literary phenomena usually studied in isolation because of linguistic barriers and the traditional departmental dividing of academic disciplines. Thus, taking into account the interrelatedness of all humanistic studies such as the various literatures but also philosophy, psychology, sociology, the visual arts and history, "comparatists" view literary creation within the total complex evolution of world literature. The historical flow of literary movements and ideas across national and linguistic borders, literary archetypes, the role of folklore and myth in literature, recurrent problems of literary theory, consideration of the less well known literatures of the world, these are some of the objects of Comparative Literature studies.

In the Spring of 1966 the Graduate Faculty approved the creation of a Comparative Literature Committee entrusted with the gradual development of an inter-departmental program which would eventually offer the M.A., the Ph.D. and research opportunities in a discipline hitherto untouched by most Canadian universities.

While the Committee makes available some of its courses as options for qualified undergraduates and graduates registered in other disciplines and appreciative of the broader perspectives offered by Comparative Literature, its main purpose is to provide courses for graduate students wishing to specialize in Comparative Literature.

## *Admission Requirements*

a) Students registered in Language Departments, wishing to follow courses in the program: proficiency in the language(s) required for each course taken.

b) M.A. students possessing a Pass B.A. or its equivalent in a major literature: proficiency in at least one language other than English, and a reading knowledge of a second language other than English, from among those languages currently taught at Carleton or approved by the Committee. If a student lacking reading knowledge of the second language is admitted into the program, he will be required to make up this deficiency.



## Comparative Literature

c) M.A. students possessing an Honours B.A. or its equivalent in a major literature: proficiency in one language other than English and reading knowledge of a second language other than English, chosen from those currently offered at Carleton, or approved by the Committee.

### *Course patterns*

A student in the Qualifying year of the M.A. should take a 400 level course in Comparative Literature and literary courses in at least two literatures. The two remaining options could include another Comparative Literature course or other relevant courses.

A student in the M.A. year must take five courses as follows:

- a) Program with thesis
  - i) Comparative Literature
  - ii) option (or Comparative Literature 17.401 if not already taken)
  - iii) option
  - iv & v) thesis
- b) Program without thesis
  - i) Comparative Literature
  - ii) Comparative Literature
  - iii) option (or Comparative Literature 17.401 if not already taken)
  - iv) option
  - v) option

Comparative Literature 17.401 must be included in either program.

Each individual program must be approved by the Committee.

Course topics in the past have included: Source and Influence, Goethe-Rousseau, The Don Juan theme in World Literature, Special topics in Modern Fiction, Faust in World Literature, the Development of the Courtly Epic, Comparative methods and their applications in Renaissance Literature.

Courses offered in 1969-70.

### **Comparative Literature 17.401** Seminar on Literary Theory

Topic for 1969-70: *Introduction to problems and concepts of Comparative Literature studies; comparative studies in literary theory*

Open to honours students in Classics, English, French, German, Italian, Russian and Spanish and to students of the Institute of Canadian Studies. Conducted in English.

*Day or Evening Division:* 1969-70 (three hours a week).

*H.-G. Ruprecht*

### **Comparative Literature 17.414** Styles and Periods

Topic for 1969-70: *Baroque Poetry in Europe*

The aim of the course is to demonstrate common stylistic features in the Baroque poetry of Germany, France, England and the Netherlands, taking into account the influence of Italy and Spain.

*Prerequisite:* reading knowledge of German or French, preferably both.

*Day or Evening Division:* 1969-70 (three hours a week).

*C. Levenson*

### **Comparative Literature 17.467** Special topics in Modern Fiction

Detailed examination of selected texts in the light of important problems in modern fiction.

*Not offered, 1969-70.*

**Comparative Literature 17.525** Literary movements of the 20th Century

Topic for 1969-70: *Neo-classical trends in European Poetry of the 20th Century*

Modern concepts of classicism; synchronic view of classical themes; characteristic "topoi" of classical poetry. Readings in W. B. Yeats, T. S. Eliot, R.-M. Rilke, S. George, G. Benn, P. Valéry, J. Guillén, G. Ungaretti, E. Montale, A. Blok, O. Mandelstam, B. Pasternak, M. Jastrun, J. Iwaszkiewicz, Cz. Milosz.

*Prerequisite:* two languages (besides English) from among those of the authors studied in the course.

*Day or Evening Division:* 1969-70 (three hours a week).

*W. Krynski*

**Comparative Literature 17.530** Literary Archetypes

Topic for Summer 1969: *The Don Juan Theme in World Literature*

A study of the literary, psychological, social and political manifestations of this well-known literary figure. The course will be conducted in English. The readings will be done, whenever possible, in the original languages.

*Prerequisites:* Reading knowledge of two of the following languages: Spanish, French, German, and permission of the instructor.

*Summer:* 1969 *Evening Division* (two lectures a week).

*W. Krynski*

**Comparative Literature 17.561** Genres in Medieval Literature

Topic for 1969-70: *The Oriental Short Story in Medieval Occidental Literature*

*Prerequisite:* Permission of the Instructor.

*Day or Evening Division:* 1969-70 (three hours a week).

*F. de Toro-Garland*

**Comparative Literature 17.590** Seminar

Topic for 1969-70: *Studies in the Picaresque Novel*

*Prerequisite:* Permission of the Instructor.

*Day or Evening Division:* 1969-70 (three hours a week).

*C. A. Marsden and H.-G. Ruprecht*

**Comparative Literature 17.599** M.A. Thesis

*Members of the Comparative Literature Committee*

*Reading lists are available for all courses.*



# Faculty of Science

Dean of the Faculty: Herbert H. J. Nesbitt, M.A., PH.D., D.SC., F.L.S.

## *Admission Requirements*

To the Qualifying University year of courses leading to the Bachelor of Science degree:

Requirements are the same as those for admission to the Bachelor of Arts degree (see p. 21), or by Mature Matriculation as prescribed above (p. 22).

To the First year of courses leading to the Bachelor of Science degrees:

(a) Completion of the Qualifying University year with an average of C— or better in mathematics and science subjects taken, *or*

(b) The successful completion of 7 credits at the Grade 13 level with a 60% general average, from the categories listed below:

1. Mathematics A (two credits).
2. Three of Chemistry, Physics, Mathematics B and Biology (three credits).
3. The remaining *two* credits are to be selected from any of the above subjects not already selected and from English, a language other than English, Geography, and History.

Students who are registered in Ontario Grade 13 for more than one year must present *five* subjects for admission.

Prospective students are asked to note that, while only a 60% general average is required for admission, they should have at least-third class honours in the mathematics and science subjects offered.

Applicants from other provinces must present acceptable equivalent certificates generally required for admission to universities in their own provinces.

All applicants will be required to present the results of the Scholastic Aptitude Tests (verbal and mathematical) of the Service for Admission to College and University or the College Entrance Examination Board.

To the Second or subsequent years of courses leading to the Bachelor of Science degree:

Applications for admission to the Second or subsequent years will be evaluated on their merits and advanced standing granted for studies undertaken elsewhere only when these are recognized as the equivalent of subjects offered in Carleton University. Work taken in the Faculty of Engineering may be counted towards a degree in Science should the student wish to transfer from the Faculty of Engineering at the end of his First or Second year.

Every student will be required to complete at least his last five courses in Carleton University.

## **Bachelor of Science**

### *Course Requirements*

Length of course. Candidates for the B.Sc. degree program will take a total of twenty courses after Junior Matriculation, or fifteen after Senior Matriculation. Candidates for the B.Sc. degree with Honours will normally take an additional five courses in their Fourth year. (See below). See also Course Load, p. 7.

Course selection. The B.Sc. program is designed to provide specialization in one field of study called a "major". The choice of the major will be made after successful completion of the First year and in consultation with the Department concerned. In addition, a candidate must fulfil the specific requirements of his Department and take such ancillary work as his Department may prescribe.

## Science

Candidates wishing to change their major field of study may do so only with the approval of both departments concerned.

Standards of Entry to a Major Subject: To be eligible for promotion to Second year and entry to a major program a student (full or part-time) must have satisfied the University regulations set forth on p. 9 and have obtained at least two grades of C, one of which must have been in the subject in which he intends to major. His program must be approved by the department in which he intends to major.

Subjects in which majors may be taken are: Biology, Chemistry, Geology, Mathematics, Physics.

Courses will be selected from those listed under Details of Courses, p. 79 as follows:

### *Qualifying University Year*

1. 2. Mathematics 69.010 and 69.011
3. 4. Two of Chemistry 65.010, Physics 75.010, Geology 67.100, Biology 61.100
5. An option chosen from English, History, a language or a third science.

### *First Year*

1. One of: Classical Civilization 13.200 or 13.201, English 18.100 or 18.101, Philosophy 32.100, Psychology 49.100 or Humanities 10.100, or another course in the humanities or social sciences numbered 100 or higher, chosen with the approval of the department in which the student intends to major.
2. Mathematics 69.100, or Mathematics 69.101 if approved by the department in which a student wishes to major.
3. { Three of:
4. { (a) Biology 61.100
5. { (b) Chemistry 65.010 or 65.100
- (c) Geology 67.100
- (d) Physics 75.010, 75.100 or 75.105

### *Second and Third Years*

A total of ten courses, five in each year: normally at least four more courses in the student's major, at least two science courses above the First year in a department or departments other than the major department, and at least one course each year chosen from subjects other than the natural sciences and mathematics. The program of each student in the Second and Third years is under the direct supervision of a full-time member of the department in which he takes his major.

Available Evening Courses. In several departments, most of the more advanced courses will normally be given, in whole or in part, in the day division only. Evening division candidates will therefore have to arrange to take certain of their major courses in the daytime. Candidates are advised to consult their major departments as early as possible to arrange their programs.

## **Bachelor of Science with Honours**

Subjects in which honours may be taken are: Biology, Chemistry, Geology, Mathematics, Mathematics and Physics, Physics, and Psychology. Note: Candidates for the Bachelor of Science degree with Honours in Psychology should elect Psychology 49.100 as the option chosen from category (1) in the First year.

The degree of Bachelor of Science with Honours in a particular discipline is designed for those students who wish to deepen and extend their studies in one particular field for the purpose of preparing themselves for the graduate schools, or for entrance to

the Specialists' Certificate of the Ontario College of Education. It is also a desirable preparation and in many cases an essential requirement for certain fields of employment.

**Length of Course.** Candidates for a degree with Honours will ordinarily take twenty-five courses in five years if admitted by Junior Matriculation, or twenty courses in four years if admitted by Senior Matriculation. With the permission of the department or departments concerned, it is possible for a candidate of exceptional ability to complete an Honours program in certain fields in three years from Senior Matriculation by taking six courses in each winter session and one in each of the summers (if necessary, completing a graduation essay or thesis where required in the summer of the graduating year).

**Course Selection.** A candidate for Honours must choose a major subject or an approved combination of subjects, normally before entry to the Second year. Details of honours courses may be found below under the respective departmental programs. Students wishing to qualify for entry to the Ontario College of Education in the course leading to the High School Assistant's Certificate Type A should consult the Registrar and the appropriate departments regarding course selection.

In the course prescriptions, the special requirements of each of the five departments in science is set forth in detail and students who wish to take advantage of the Honours program are advised that they must consult with the Chairman of the Department of their choice.

Students may enter Honours in science from Senior Matriculation with at least 65% average or by transfer from the First year course with at least third class standing (see p. 13) and the recommendation of their department. The First year of the Honours science program consists of the present First year of the general B.Sc. program with the option of a sixth course, which may be chosen in consultation with a member of the major department.

**Language requirement.** Before graduation, the candidate for the B.Sc. degree with Honours will be required to show that he has a reading knowledge of at least one of French, German, or Russian (or two of these, at option of the major department.)





# Faculty of Engineering

Dean of the Faculty: D. A. George, B.ENG., M.S., SC.D.

## Bachelor of Engineering

(offered in the Day Division only)

The Bachelor of Engineering degree is awarded on successful completion of a four year program of studies. In the first three years the emphasis is on mathematics, physics, chemistry, and the engineering sciences. The following options or fields of study are offered in the fourth year of the B.Eng. curriculum: Civil Engineering, Electrical Engineering, and Mechanical Engineering.

The engineering programs of study offered at Carleton University meet the academic requirements for professional engineering registration by the Association of Professional Engineers of the Province of Ontario. The programs of study also meet the academic requirements for professional registration in the provinces of Alberta, British Columbia, Manitoba, Newfoundland, New Brunswick, Quebec, and Saskatchewan. The degree of Bachelor of Engineering in Electrical Engineering satisfies the educational requirements of the Institution of Electrical Engineers of London, England, and carries complete exemption from the Institution's Examinations.

### *Admission Requirements*

(a) *First Year*—For admission to the First year of the program of studies leading to the Bachelor of Engineering degree, an applicant must have passed the Qualifying University year at Carleton University (see p. 52) with a grade of C or better in Mathematics, Chemistry and Physics; or Ontario Grade 13 (Senior Matriculation)\* in the following subjects, with an *average of at least 60%*:

1. Mathematics A and B
2. Physics
3. Chemistry
4. One of: English (see footnote page 56,) a language other than English, Biology, Geography, History.

Students who are registered in Ontario Grade 13 for more than one year must present *five* subjects for admission.

\*Applicants from other provinces must present acceptable equivalent certificates generally required for admission to universities in their own provinces.

All applicants are required to present the results of the Scholastic Aptitude Test (verbal and mathematical) of the Service for Admission to College and University or the College Entrance Examination Board.

(b) *Advanced Standing*—Applications for admission with advanced standing to the second or subsequent years of the program leading to the Bachelor of Engineering degree will be evaluated on an individual basis. Advanced standing for subjects completed at another university or college will be accepted only if the subject is recognized as the equivalent of a corresponding subject offered at Carleton University. Transfer of credit for the academic work of the First year of an Engineering program completed at another university or college will be considered provided the grade point average is equivalent to at least 3.7. Transfer of credit for the work of the Second and Third years will be considered provided the grade point average is equivalent to at least 4.2 and 4.8 respectively.

### *Course Requirements*

Candidates for the Bachelor of Engineering degree are required to complete a prescribed program of studies covering four years after Senior Matriculation. The pro-

## Engineering

grams of study are outlined in pp. 56-59. The subjects comprising the programs of study are described under Details of Courses, pp. 79-326.

A candidate for the Bachelor of Engineering degree must have at least six months of suitable practical experience in technical work. Evidence of appropriate summer employment or other technical experience must be submitted not later than October 1 on forms obtainable from the Faculty of Engineering.

All students entering the Fourth year of the Engineering program must submit a summer essay. The summer essays should be written on a topic drawn from the experience gained by the student during his summer employment and must be submitted to the Dean of Engineering on or before October 1.

In addition to the regular course requirements, candidates for the B.Eng. degree are required to attend seminars and field trips arranged specially for undergraduate students.

### *First Year*

Subject	Lecture Hours Per Week		Laboratory and Problem Analysis Hours per Week	
	First Term	Second Term	First Term	Second Term
Chem. 65.105 (Qualitative Analysis and Elementary Physical Chemistry)	3	3	3	3
English 18.115 (English)*	3	3	—	—
Math. 69.100 (Introductory Calculus and Algebra)	4	4	—	—
Math. 69.135 (Algebra and Geometry)	1	1	—	—
Physics 75.100 (Introductory Physics)	3	3	3	3
Eng. 87.100 (Engineering Drawing and Geometry)	1	1	5	5
Eng. 81.110 (Mechanics I)	2	2	—	—
	17	17	11	11

Students desiring an introduction to surveying may register in Eng. 84.104 as a non-credit elective.

\*An applicant who is granted admission without credit in Grade 13 English, or the equivalent, may register in either English 18.010 or English 18.115 provided the grade earned in Grade 12 English is at least 70%. If the grade earned in Grade 12 English is below 70% the applicant will be required to register in English 18.010. If the grade earned in English 18.010 is C or lower the student will be required to select either English 18.115, 18.100 or 18.102 as the elective in the Second year program.

*Second Year*

Subject	Lecture Hours Per Week		Laboratory and Problem Analysis Hours per Week	
	First Term	Second Term	First Term	Second Term
Geology 67.201 (Introductory Geology)	3	—	3	—
Math. 69.201 (Intermediate Calculus and Algebra)	4	4	—	—
Physics 75.230 (Introductory Electricity and Magnetism)	3	3	3	3
Eng. 81.211 (Mechanics II)	—	3	—	3
Eng. 81.220 (Mechanics of Materials I)	3	—	3	—
Eng. 95.265 (Computer Programming)	1	1	1	1
Eng. 86.270 (Elem. of Materials Science)	—	3	—	3
Elective (Humanity or Social Science)	3	3	—	—
	17	17	10	10

*Third Year*

Subject	Lecture Hours Per Week		Laboratory and Problem Analysis Hours per Week	
	First Term	Second Term	First Term	Second Term
Math. 69.305 (Complex Variable)	3	—	—	—
Math. 69.306 (Math. Methods I)	—	3	—	—
Eng. 87.312 (Mechanics of Machines I)	3	—	—	—
Eng. 81.321 (Mechanics of Materials II)	—	2	—	3
Eng. 89.330 (Fluid Mechanics)	2	2	3/2	3/2
Eng. 90.340 (Thermodynamics)	3	—	3	—
Eng. 90.341 (Intro. to Heat Transfer)	—	2	—	3/2
Eng. 93.351 (Funda. of Electric Circuits)	3	—	3	—
Eng. 98.361 (Intro. to Electric Machines)	—	3	—	3/2
Eng. 93.357 (Electronics I)	—	3	—	3/2
Eng. 95.366 (Computer Applications)	3	—	—	—
Elective (Humanity or Social Science)	3	3	—	—
	20	18	7½	9

## Engineering

### *Fourth Year (Civil Engineering Option)*

Subject	Lecture Hours Per Week		Laboratory and Problem Analysis Hours per Week	
	First Term	Second Term	First Term	Second Term
Eng. 99.497 (Engineering Project)	—	—	4	6
Eng. 82.420 (Introduction to Structural Analysis)	3	—	3/2	—
Eng. 82.421 (Analysis of Elastic Structures)	—	2	—	3/2
Eng. 82.423 (Reinforced Concrete)	—	3	—	3
Eng. 83.424 (Soil Mechanics)	3	—	3/2	—
Eng. 82.425 (Design of Structural Components)	3	—	3/2	—
Eng. 89.431 (Hydrology)	2	—	3/2	—
Elective (Engineering)*	—	2	—	3/2
Elective (Basic Science or Engineering)*	2	2	3/2	3/2
Elective (Humanity or Social Science)	3	3	—	—
	16	12	11½	13½

\*Engineering electives offered: 81.411—Introduction to Solid Mechanics, 82.426—Design of Steel Structures, 82.428—Foundation Eng., 84.429—Highway Eng., 84.433—Urban Planning, 84.434—Transportation, 89.435—Fluid Machinery, 89.436—Hydraulic Structures, 86.471—Applied Materials Science.

### *Fourth Year (Electrical Engineering Option)*

Subject	Lecture Hours Per Week		Laboratory and Problem Analysis Hours per Week	
	First Term	Second Term	First Term	Second Term
Eng. 99.497 (Engineering Project)	—	—	4	6
Eng. 94.451 (Signal Processing)	—	3	—	—
Eng. 97.453 (Electric Transmission and Radiation)	—	3	—	3/2
Eng. 97.454 (Electromagnetic Fields)	3	—	—	—
Eng. 94.455 (Feedback Control Systems)	3	—	—	—
Eng. 93.458 (Electronics II)	2	3	3	3/2
Eng. 96.468 (Solid State Electronics)	3	—	3/2	—
Elective (Basic Science or Engineering)**	2	4	3/2	3
Elective (Humanity or Social Science)	3	3	—	—
	16	16	10	12

\*Engineering electives offered: 90.443—Energy Conversion, 94.456—Feedback Control Laboratory, 95.466—Switching Circuits, 86.475—Electronic Properties of Materials, 98.462—Electrical Machines, 96.469—Semiconductor Devices and Circuits.

\*\*In Second Term two electives must be selected.

*Fourth Year (Mechanical Engineering Option)*

Subject	Lecture Hours Per Week		Laboratory and Problem Analysis Hours per Week	
	First Term	Second Term	First Term	Second Term
Eng. 99.497 (Engineering Project)	—	—	4	6
Eng. 87.401 (Mechanical Analysis and Design)	2	2	3/2	3
Eng. 90.442 (Applied Thermodynamics)	3	3	3/2	3/2
At least three of:				
Eng. 81.411 (Intro. to Solid Mechanics)				
Eng. 88.414 (Vibration Analysis)	4	2	3	3/2
Eng. 89.432 (Fluid Dynamics)				
Eng. 90.443 (Energy Conversion)				
Electives (Basic Science or Engineering)*	3	4	3/2	3
Elective (Humanity of Social Science)	2	3	—	—
	14	14	11½	15

\*Engineering Electives offered: 89.435—Fluid Machinery, 88.437—Mechanics of Flight, 88.447—Heating, Ventilating and Air Conditioning, 88.452—Control Systems and Instrumentation, 94.455—Feedback Control Systems, 94.456—Feedback Control Laboratory, 86.471—Materials Engineering.

*Promotion Requirements.* The general regulations regarding failure, repetition, and probation are outlined on p. 10.

*Graduation Requirements*

In order to fulfil the minimum graduation requirements for the degree of Bachelor of Engineering, a candidate must have passed all the course requirements of the first to fourth years, inclusive, with an overall weighted grade point average of at least 3.4 and, in addition, must be recommended for graduation by the Faculty of Engineering.

*Degrees with Distinction*

Upon recommendation of the Faculty of Engineering, the notation "with High Distinction" may be made on the academic records of a candidate for the degree of Bachelor of Engineering. To receive this recommendation the candidate is expected to obtain a weighted grade point average of at least 9.0 in the course requirements of the final year and, in addition, a weighted grade point average of at least 7.8 in the course requirements of the first to fourth years, inclusive.

Upon recommendation of the Faculty of Engineering, the notation "with Distinction" may be made on the academic records of a candidate who achieves a weighted grade point average of at least 7.8 in the final year and, in addition, at least 6.6 in the course requirements of the first to fourth years, inclusive.



### Master of Engineering

The Faculty of Engineering offers graduate courses leading to the Master of Engineering degree in the fields of Aeronautical Engineering, Civil Engineering, Electrical Engineering, Mechanical Engineering, and Materials Engineering. The courses offered are described under Details of Subjects, pp. 129-159. The graduate programs in Engineering provide an opportunity for both full-time and part-time studies. Candidates who are employed on a full-time basis will normally require three academic years, or two academic years plus two summer terms, of part-time study to complete the requirements for a Master's degree. The study load of a candidate who is employed full-time is restricted to a maximum of six lecture-hours a week.

In addition to the general requirements for admission to the Faculty of Graduate Studies, as specified on p. 67, a candidate for the Master of Engineering degree is required to have strong undergraduate preparation in Mathematics and Physics, and an introduction to computer programming. Applicants who intend to specialize in Materials Engineering are expected to have studied at the undergraduate level for courses in Dynamics, Mechanics of Materials, Thermodynamics, Electronics, Materials Science, and Materials Engineering. Applicants who intend to specialize in Aeronautical Engineering are expected to have studied at the undergraduate level for courses in Dynamics, Fluid Mechanics, Mechanics of Machines — Vibrations, Thermodynamics, Electronics, and Elementary Applied Aerodynamics. For Civil Engineering, applicants are expected to have studied at the undergraduate level in Dynamics, Fluid Mechanics, Mechanics of Materials, Structural Design, Structural Analysis, Reinforced Concrete, Soil Mechanics, and Foundations. For Mechanical Engineering, applicants are expected to have studied at the undergraduate level in Dynamics, Mechanics of Machines — Vibrations, Machine Design, Mechanics of Materials, Fluid Mechanics, Thermodynamics, Heat Transfer and Electronics. Applicants who intend to specialize in Electrical Engineering are expected to have studied at the undergraduate level for courses in Feedback Control Systems, Electrical Machines, Electronics, Electromagnetic Field Theory, Solid State Electronics, Circuit Analysis, Electrical Transient Phenomena, Signal Processing.

Candidates for the M.Eng. degree in Electrical Engineering may also be required to complete an orientation program in Real-Time and Hybrid Computer Programming (an introduction to the use of the PDP-8 digital computer, TR-10 analog computer and associated interfacing and peripherals) during the first term.

Courses offered by applicants as undergraduate preparation for the Graduate Program should be comparable in level and content to courses offered in the current Faculty of Engineering undergraduate curriculum. Since most graduate courses are based on the work of the senior undergraduate year, applicants should examine carefully the descriptions of courses carrying 400 numbers in their area of interest. Detailed information regarding prerequisites to a particular course may be obtained from the Dean of Engineering.

The graduate study program in Engineering is an elective program. Candidates may select a number of courses which relate to their particular field of interest or activity. Individual programs must, however, form an integrated, balanced unit with emphasis on one, or at most two, aspects of the field of specialization. The program of studies for full-time students will ordinarily include three courses in the first term, three courses in the second term, and a thesis. The program must include at least two graduate level courses in Engineering, both terms. Each candidate will be required to take an oral examination on the subject of his thesis and related fields. The examination will be conducted by an Examining Board appointed by the Dean of the Faculty of Engineering.

All candidates are required to demonstrate, to the satisfaction of the Examining Board, their ability to solve a reasonably complex problem, related to their field of

specialization, using either an electronic analog or a digital computer. The Board will accept credit in an appropriate course, or may, at its discretion, conduct an independent examination.

The thesis must represent the results of the candidate's independent research or development work, undertaken after admission to graduate standing at Carleton University. Experimental or theoretical results, previously published by the candidate, may be used only as introductory or background material for the thesis. A candidate may be permitted to carry on thesis research work off-campus providing the work is approved in advance and arrangements have been made for supervision of thesis-research activities by a faculty member of Carleton University. A part-time student may use the Faculty of Engineering laboratory facilities for on-campus thesis research and development activities. In such cases a period of not less than three calendar months of full-time University residence is required.

A candidate for the Master's degree who has, before admission, completed independent research or developmental projects of an adequate level of accomplishment, may apply to the Faculty of Graduate Studies for a waiver of the thesis requirement. Such application must be made at the time of initial registration and must be supported by copies of published reports describing the work. If the application is approved, the candidate must take ten full courses or the equivalent, six of which must be graduate level courses in Engineering, to fulfill the requirement for the award of a degree without a thesis. A candidate who has been granted a waiver of the thesis requirement will be required to take an oral examination on the subject of one of his published papers and topics related to his field of specialization.

Credit for one graduate course completed with a grade of B— or higher at another University may be offered in partial fulfilment of the requirements for award of the Master of Engineering degree, providing the course submitted for transfer credit is appropriate to the candidate's graduate program at Carleton University, and the credit for the course has been earned not more than three years prior to admission to graduate standing at Carleton. Applications for transfer of credit must be made at the time of initial registration.

A member of the faculty will be associated with each degree candidate as program adviser. The candidate is required to meet his adviser during the week preceding registration to discuss and determine his program of study.

A limited number of students, who are not candidates for the Master of Engineering degree, may be admitted to each graduate Engineering course as special students. An applicant for special student status requires the consent of the instructor. This consent must be obtained no later than the week preceding registration. Special students are expected to write the regular examinations in the course and must register during the normal registration period. Credit earned as a special student cannot be counted towards the requirements of an advanced degree in Engineering.

### *Doctor of Philosophy in Engineering*

The Faculty of Engineering offers courses of study and research leading to the degree of Doctor of Philosophy in Engineering in the fields of Aeronautical, Civil, Electrical, and Mechanical Engineering. For admission to a doctoral program an applicant must hold a Master's degree in Engineering, or its equivalent, and, by his previous program of study and scholastic record, demonstrate a capacity for advanced study and research.

Candidates are subject to the General Regulations of the Faculty of Graduate Studies, page 68, in addition to the particular requirements of the Faculty of Engineering. The program of studies must include at least four graduate courses in Engineering, and at least one advanced course in Mathematics or Physics or Chemistry or Geology,

## Engineering

and a substantial thesis. Concurrent with preparation of the thesis a minimum period of twelve calendar months of full-time University residence is required. All candidates will be required to take a comprehensive examination which will ordinarily include both written and oral examinations. Each candidate will also be required to take a final oral examination on the subject of his thesis and related fields.

The Faculty of Engineering requires a candidate to demonstrate an understanding of a second language sufficient to support short-term residence in an area where that language is indigenous. The candidate will satisfy the language requirement in three steps.

(i) Show standing of C— or better in a full course at the introductory level, offered at Carleton, in a language other than English, appropriate to his area of professional interest.

(ii) Demonstrate reasonable understanding, on sight, of material contained in selected samples of the daily press in that language.

(iii) Translate on sight from the language into English and from English into the language a group of technical terms appropriate to his area of professional interest selected from an assigned vocabulary of some five hundred words.

If a candidate whose mother tongue is not English elects his mother tongue as the second language, he will be required to demonstrate a high degree of proficiency in translation of a wide range of general engineering literature.

### *The Graduate Seminar*

Graduate Seminars are held throughout the Fall and Spring terms. Current research, recent publications, thesis proposals and progress reports are among the topics discussed. Seminars are also held, irregularly, during the summer. Attendance at the Graduate Seminar is mandatory for full-time graduate students in the Faculty of Engineering.

### *Fellowships for Graduate Studies*

Fellowships, ranging in value from \$1,600 to \$3,500, are available to full-time students. In addition, well qualified applicants will be considered for research assistantships ranging in value up to \$3,000 and graduate assistantships carrying a stipend of up to \$1,200. These awards are made only after the applicant has gained admission to the Faculty of Graduate Studies. Applications for such awards will be received up to March 1, 1970.

### *Carleton Computing Facilities*

The Carleton University Computing and Data Processing Center is equipped with a General Electric 415 digital computer, located in the Steacie Building, and an IBM 1620 located in the C. J. Mackenzie Building. The 1620 is now associated primarily with undergraduate instruction, for both computer oriented courses and as one of the aids available to students. The 1620 is equipped with core and disk memory, line printer and card reader. The GE 415 is intended for graduate and faculty research and for administrative data processing. It is equipped with 32 K word core memory, disks, magnetic tapes, a high speed printer and a card reader.

Use of the equipment of the Center by students registered in courses requiring its use, and for individual thesis research, is granted on the recommendation of the instructor or thesis supervisor, and the approval of the Dean of the Faculty of Engineering.



# School of Architecture

Director of the School: Douglas Shadbolt, B.Arch., F.R.A.I.C.

## *Advisory Council:*

Davidson Dunton, President of the University

Douglas Shadbolt, Director of the School

Donald A. George, Dean of Engineering

Gordon S. Adamson, Ontario Association of Architects

D'Arcy Helmer, Architect, Ottawa

Ian MacLennan, Vice-President, Central Mortgage and Housing Corporation

Guy Desbarats, Doyen, Faculté de L'Aménagement, Université de Montreal

Gordon C. Merrill, Associate Dean, Division II, Faculty of Arts

In September 1968, Carleton University accepted students into the First Year of a new five-year program leading to the Bachelor of Architecture degree, and it plans to open an additional year of the program each successive year until the first students graduate in 1973. Accordingly, the First and Second Year of the program are now available and are described in this Calendar. Further information about the School and the program is available in a brochure which can be obtained by writing direct to the School of Architecture.

The curriculum in Architecture at Carleton is expected to provide the student with:

- (a) an understanding of our society with an emphasis on the identification of its building problems ranging from those of rudimentary shelter to the City itself, past, present and future; (the contributions of many other disciplines will be relevant here, eg., sociology, anthropology, psychology, history, geography, political science, economics).

- (b) the means of problem analysis with experience in solving aspects of a wide range of building problems (the evolving design methodologies, systems analysis, and the use of computers will all be relevant here).

- (c) the means for development of individual creativity and ability to communicate.

- (d) the technical and professional information and skill needed to transform his designs into completed buildings.

- (e) the opportunity to explore one or two subject areas in considerable depth, thus allowing the student to develop the beginnings of a specialized career within the broad field of architecture, eg., administration and management, environmental control, etc.

The curriculum will provide a highly varied experience for the student in lectures, seminars, library, studios, and workshops. The major part of his contact with the teaching staff will be on a one-to-one basis in the studio, as the emphasis in the program will be placed on individual growth and development.

The resources of the Ottawa area, including those of Carleton University, are unique in their concentration of specialized personnel, laboratories, libraries, and other facilities. These resources provide an ideal base on which to develop a School of Architecture. They will ultimately provide the opportunity and capability for a wide range of interdisciplinary academic and research programs in fields of architecture such as housing, urban environmental studies, and industrialized building.

## *Admission Requirements for 1969-70*

(a) *First Year* — For admission to the First year of the program of studies leading to the Bachelor of Architecture degree, the applicant must have passed the Qualifying University year examinations at Carleton University in five courses with a grade of C— or better in each of Mathematics, Physics and English; or the Ontario Senior

## Architecture

Matriculation (Grade 13) examinations (or the equivalent examinations of other recognized examining bodies) in the following subjects, with an average of at least 60%.

1. Mathematics A and B.

2. Physics.

3, 4. Two of: Biology, Chemistry, English, Geography, History, or another language. Students who are registered in Ontario Grade 13 for more than one year must present five subjects for admission.

Applicants from other provinces must present acceptable equivalent certificates to the above and as outlined on page 3.

All applicants are required to present the results of the Scholastic Aptitude Test (verbal and mathematical) of the Service for Admission to College and University or the College Entrance Examination Board.

(b) *Advanced Standing* — Applications for admission with advanced standing to the second or subsequent years of the program leading to the Bachelor of Architecture degree will be evaluated on an individual basis. Advanced standing for subjects completed at another university or college will be accepted only if the subject is recognized as the equivalent of a corresponding subject offered at Carleton University. Transfer of credit for the academic work in the First year of an Architecture program completed at another university or college may be considered provided the weighted average is at least C—, and the student shows evidence of aptitude for design studio work by the production of a portfolio of original drawings or photographs, etc., and as a result of an interview with designated Faculty of the School. For the 1969-70 session only, students who have completed First year Engineering at Carleton University will be accepted into Second year Architecture, provided the weighted average is C— and the student meets the above conditions.

### Course Requirements

The program of study for the first two years in Architecture appears in the following sections, and the detailed course descriptions appear on page 85 of the Calendar.

Subject	Lecture Hours Per Week	Problems, Laboratory or Discussion Hours Per Week
	First & Second Term	First & Second Term
First Year (Commencing 1969-70 Session)		
Arch. 76.100 (Colloquium I)*	2	2
Arch. 77.100 (Environmental Controls I)	2	0
Arch. 77.120 (Structures I)	3	3
Arch. 79.100 (Computations I)	2	2
Journ. 28.100 (Communications I)	1	2
Arch. 80.100 (Studio Workshop I)	0	9
	10	18

\*Lectures in Colloquium I will be given to combined First and Second years, and the content will extend over two years. Discussion groups will be organized with twenty students or less.

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**Second Year (Commencing 1969-70 Session)\*\***


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Arch. 76.200 (Colloquium I)*	2	2
Arch. 77.200 (Environmental Controls II)	2	0
Arch. 77.220 (Structures II)	3	3
Arch. 79.200 (Computations II)	2	2
Arch. 80.200 (Studio Workshop II)	0	12
	9	19

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\*Lectures in Colloquium I will be given to combined First and Second years, and the content will extend over two years. Discussion groups will be organized with twenty students or less.

\*\*Content of Second year courses will be developed in format shown for 1969-70 but modified slightly in subsequent years to adjust to new First year content introduced in 1969-70.

The tentative program of study for the Third, Fourth and Fifth years in Architecture is outlined in the following section. This program is subject to change as details are developed, and as the organization of the School develops. Detailed course descriptions will be available in the Calendars for the session in which the program will commence.

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**Third Year (to commence 1970-71 Session)**


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Arch. 76.300 (Colloquium II)*	2	2
Arch. 80.300 (Studio Workshop III)	0	15
(Electives).*	10	0
	12	17

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**Fourth Year (to commence 1971-72 Session)**


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Arch. 76.400 (Colloquium II)*	2	2
Arch. 80.400 (Studio Workshop IV)	0	15
(Electives).*	10	0
	12	17

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**Fifth Year (to commence 1972-73 Session)**


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Arch. 76.450 (Colloquium III)	2	2
Arch. 80.450 (Studio Workshop V)	0	20
(Electives).*	4	0
	6	22

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\*Lectures in Colloquium II will be given to combined Third and Fourth years and the content will extend over two years. Discussion groups will be organized with twenty students or less.

\*\*The student will select a total of ten courses during the Third, Fourth and Fifth years, eight of which will be chosen from a designated pattern of courses set out by the organizational divisions of the School as leading to a thesis in the Fifth year in one of several subject areas in which concentrated study and specialization is to be encouraged. Full details on this aspect of the program will not be available until the summer of 1970.



## Architecture

### *Promotion Requirements*

The general regulations regarding failure, repetition and probation are outlined on pp. 9-10 of this Calendar.

In order to qualify for promotion from one year to the next, an architectural student must attain a weighted average grade of at least C— and he must have passed either the final examination, the term work, or the supplemental examination in each subject of his program.

To qualify for supplemental examination privileges in any one course a student must attain a weighted average of at least D in the final examinations.

No supplemental examination will be allowed in a studio-workshop course, and a failure in the term work in these courses means that the whole course must be repeated.

If, after final and supplemental examinations, a student has failed to achieve standing in a subject which is a prerequisite for the course work of the following year, he may repeat the year's work or clear the deficiency as a part-time student. If the failed subject is not a prerequisite for the course work of the following year, the student may be conditionally promoted and may be permitted to repeat the failed subject as an extra subject, provided his weighted average is at least C. If the academic standing of an architectural student does not meet the minimum promotion requirements, he may *either* clear his deficiency as a part-time student *or* apply to the Committee on Admission and Studies for permission to repeat the year's work. If permission is granted, he will be placed on probation for that academic year.

# Faculty of Graduate Studies

Dean of the Faculty: To be appointed

Courses leading to Master's degrees are offered in Biology, Canadian Studies, Chemistry, Classics, Comparative Literature, Economics, Engineering (Aeronautical, Civil, Electrical, Materials, Mechanical), English, French, Geography, Geology, German, History, International Affairs, Mathematics, Philosophy, Physics, Political Science, Public Administration, Psychology, Sociology, Spanish. Courses leading to Doctor's degrees are offered in Biology, Chemistry, Engineering, Geology, Mathematics, Physics, Political Science, Psychology. Each candidate will be under the direction of a department, institute, or school, and must comply with any special conditions prescribed. Graduate students are under the general regulations of the University, and also those stated below. Candidates are advised that the number of places is limited, and even if their qualifications are satisfactory, it may not be possible to admit them. If the candidate's application is received by April 1, every effort will be made to inform him as to acceptance by May 1.

A candidate who wishes to graduate at the May convocation must submit his thesis (where applicable) to his department, in examinable form, by April 15; and for the fall convocation, by September 15.

As stated in the inside front cover of this Calendar, the University reserves the right to make whatever changes circumstances may require, including cancellation of particular courses. Graduate courses may have to be withdrawn if the enrolment of full-time degree candidates is insufficient.

## **Master of Arts, Master of Science, and Master of Engineering**

### *Admission Requirements*

Candidates must normally have a bachelor's degree with at least second class standing for admission, and those with pass degrees will require the equivalent of two years' full-time study, while those with honours degrees will require the equivalent of one year's full-time study. Other candidates with equivalent standing may be admitted on departmental recommendation, subject to the approval of the Faculty of Graduate Studies. Candidates may be required to make up deficiencies in their background.

### *Course Requirements*

The requirement for the final year of the Master's degree will be five courses or the equivalent. Directed special studies may be counted as one course, while a substantial thesis based on the student's own research may be counted as two courses. Some courses may be selected from those open to undergraduates (200-499), but when such a course is taken for graduate credit the completion of additional assignments may be required. At least three courses (including the thesis) must be selected from those numbered 500-599. A grade of B or better must be obtained in each course counted for credit towards the Master's degree.

### *Examinations*

In addition to the usual examinations in individual courses, each candidate writing a thesis will be required to take either an oral examination on his thesis or a comprehensive in his field. At the direction of his department, both examinations may be required, or they may be combined. When the degree is taken by course work, a comprehensive examination may be required. Departments may also require examinations in languages other than English.

## **Graduate Studies**

### *Time Limitation*

A candidate who fails to complete the requirements for the degree within three years, or a part-time candidate who fails to complete the requirements for the degree within six years, from the date of his initial registration in a Master's program beyond honours standing or the equivalent must, if he wishes to continue, apply for extension of time. A student who, within this period remains unregistered for his degree program for a period of more than one year, will lose his graduate student status. An extension of the time limit will not, in normal circumstances, exceed one year.

### *Thesis*

The candidate must provide four typewritten copies (original and three carbons), or acceptable duplicated copies, on a suitable grade of paper, 8½ by 11 inches. The thesis must be typed double-space, in a standard type-face, on one side of the paper, with at least 1½ inch margin at the left. The candidate must meet any special requirements of his department governing the form of the thesis, including methods of bibliographical entry, use of diagrams, tables, and the like. A suitable abstract is to be provided, of length not exceeding 150 words. The original copy should be presented in an envelope, unbound in order of pagination, and the copies in spring binders, with the pages not mutilated in any way. The candidate gives the University the right to microfilm, photostat, and circulate the thesis and abstract, as may be required.

## **Doctor of Philosophy**

### *Admission Requirements*

Candidates will ordinarily have already taken the Master's degree. In some cases a combined Master's and Doctoral program may be arranged by the candidate's department.

### *Course and Thesis Requirements*

The period of formal study and research required in the Ph.D. program will be at least two years of full-time study, or the equivalent, beyond the Master's qualification. The thesis will ordinarily carry a weight of about one half of the total requirement. The thesis must be a contribution to knowledge, and must demonstrate the candidate's capacity to undertake sustained research and to report the results in a fashion appropriate to the subject matter. The regulations stated above for the Master's thesis also apply, except that the abstract may be up to 600 words in length.

### *Examinations*

- (a) A qualifying examination may be set at the beginning of the course.
- (b) A comprehensive examination covering prescribed fields will be set, ordinarily one year before the thesis is to be presented. This examination, which may be oral or written, or both, may include any work fundamental to a proper comprehension of the major subject.
- (c) After the thesis has been received and approved, a final oral examination on the subject of the thesis and related fields will be held.
- (d) Language requirements will be prescribed by departments, according to the needs of their students, and subject to approval by the Faculty of Graduate Studies. For further information see the departmental programs.

### *Time Limitation*

A full-time candidate who fails to complete the thesis within 5 years after initial registration must, if he wishes to continue, apply for extension of time. An extension of time limit will not in normal circumstances, exceed one year.

**Graduate Fees***M.A., M.SC., M.Eng. — Full-time*

1st Year	\$448.00 per calendar year
Thereafter	\$ 95.00 per term

*Ph.D. — Full-time*

1st Year	\$448.00 per calendar year
2nd Year	\$448.00 per calendar year
Thereafter	\$ 65.00 per term

*Part-time Graduate Students*

Each course or equivalent — \$100.00

Included in these composite fees for full-time graduate students are the following:

	<i>Per Term</i>	<i>Per Year</i>
Students' Association	5.00	15.00
Athletics	5.35	16.00
Health Services	8.00	25.00
Univ. Union contribution	3.35	10.00
	<u>21.70</u>	<u>66.00</u>

If a graduate student first registers in September, his fees will be applied to the Fall, Winter and Spring terms immediately following. If he first registers in May, his fees will be applied to the Spring, Fall and Winter term immediately following.

A Ph.D. student registering for his second year will be assessed for that year one year after the date of his original registration.

Where a graduate student requires further time to complete his programme beyond the standard one year for M.A. or two years for Ph.D., he will be assessed at the per term rate outlined.



# The Institute of Canadian Studies

Director: Pauline Jewett, M.A., PH.D.

General Editor, Carleton Library: Robert L. McDougall, M.A., PH.D.

## *Committee of Management*

Davidson Dunton, President of the University

Gordon C. Merrill, Dean, Faculty of Arts

A. Trevor Tolley, Associate Dean, Division I, Faculty of Arts

Wilfrid Eggleston, Professor Emeritus

Mary-Louise Funke (Art)

Gilles Paquet (Economics)

R. D. M. Mathews (English)

Michel Gaulin (French)

Duncan M. Anderson (Geography)

Stanley R. Mealing (History)

Wilfred H. Kesterton (Journalism)

J. George Neuspiel (Law)

John Churchill (Music)

H. B. Mayo (Political Science)

Victor F. Valentine (Sociology and Anthropology)

## *Visiting Fellows:*

1962-63: Professor Mason Wade

1963-64: Hon. M. J. Coldwell

1964-65: Professor S. F. Wise

1965-66: Douglas Fisher

1965-66: Dr. Diamond Jenness

1966-67: O. S. Soroko-Tsupa, Lecturer, Department of History, Univ. of Moscow

1967-68: Michael Gnarowski, Department of English, Sir George Williams University

1967-68: Alfred Purdy, Canadian poet

1968-69: Harry J. Boyle, Vice-Chairman, Canadian Radio-Television Commission

1969-70: Professor Edward J. Miles, Director, Canadian Studies Program,  
University of Vermont

## *The Graduate Program*

Through the medium of the Institute, eleven departments in the humanities and social sciences co-operate to offer an M.A. program in Canadian Studies which is interdisciplinary in emphasis but which at the same time enables the student to maintain a firm base in the discipline of his choice. The skills and attitudes of particular disciplines are therefore respected; they are brought, wherever possible, into a relationship in which one set of skills and attitudes supports and extends the range of another. This context is further widened by the provision of a comparative dimension to Canadian Studies wherein students are encouraged to see certain aspects of Canadian culture in relation to corresponding aspects of the cultures of countries with which Canada has had traditional ties: Great Britain, France, the United States, Australia. The proximity of Carleton University to the National Library, the Library of Parliament, the Public Archives of Canada, the Dominion Bureau of Statistics, and the libraries of government departments and embassies ensures excellent facilities for research in the fields of study with which the Institute is concerned.



## Canadian Studies

### *M.A. Requirements*

1. Three approved courses plus a thesis  
or  
four approved courses plus a research essay
2. An oral comprehensive examination.

### *Eligibility for Admission*

Applicants must normally have an Honours B.A., with at least second class standing, in one of the disciplines represented in the Institute.

A reading knowledge of French is a prerequisite for admission.

Such applicants will normally complete the M.A. in one year unless they need to take preliminary work in fields they wish to enter at the graduate level but in which they have had insufficient undergraduate training.

Applicants with pass degrees, and at least second class standing, may be admitted. They will require the equivalent of two years' full-time study for the M.A.

### *Course List*

*Interdisciplinary Seminar* (Canadian Studies 12.500)

*Research Essay* (Canadian Studies 12.598)

*Thesis* (Canadian Studies 12.599)

*The Economic Development of Canada* (Economics 43.325)

*The Canadian Economy* (Economics 43.520)

*Canadian Literature* (English 18.382)

*The Literary Imagination in Canada* (English 18.587)

*Le roman canadien de langue française* (French 20.520)

*Regional Development and Planning in Canada* (Geography 45.333\*)

*Geography of a Selected Drainage Basin* (Geography 45.334\*)

*Geography of the Northlands* (Geography 45.430)

*Historical Geography* (Geography 45.435)

*France Canada Since Confederation* (History 24.331)

*Canada-United States Relations* (History 24.334)

*Selected Problems in the Social and Economic History of pre-Confederation Canada* (History 24.430)

*New France* (History 24.431)

*Selected Problems in the Social and Political Development of 20th Century Canada* (History 24.433)

*The Social and Economic History of the Canadas, 1784-1850* (History 24.530)

*Post-Confederation Canada* (History 24.533)

*The Historiography of North America* (History 24.588)

*Basic Issues in Canadian Society* (Journalism 28.402\*)

*The Press in Modern Society* (Journalism 28.410)

*The Legal Process* (Law 51.300)

*Introduction to Public Law* (Law 51.305)

*Canadian Constitutional Law* (Law 51.450)

*Government of Canada* (Political Science 47.400)

*Federalism* (Political Science 47.405)

*Provincial and Municipal Government* (Political Science 47.500)

*The Political Process in Canada* (Political Science 47.510)

*Nationalism* (Political Science 47.520)

*The Canadian and American Political Traditions* (Political Science 47.535)

*Canada in World Affairs* (Political Science 47.560)

*Race and Ethnic Group Relations* (Sociology 53.325\*)

*Power and Stratification* (Sociology 53.345\*)

*Urban Studies* (Sociology 53.455\*)

*Indians and Eskimos of North America* (Sociology 53.470)

*Canadian Society* (Sociology 53.525)

Carleton's Institute and the Institute of Commonwealth and Comparative Studies at Queen's University, Kingston, co-operate in the related fields of Canadian and Commonwealth Studies. Graduate students in the Institute of Canadian Studies' program may be attached, between terms or for a summer session, to the Institute at Queen's, where they will be offered facilities for study and access to the special Canadian and Commonwealth collections of the Queen's University library. Students in the Institute of Commonwealth and Comparative Studies may similarly be attached for short periods of time to the Institute of Canadian Studies at Carleton.

*Forms for admission to graduate studies may be obtained from the Dean, Faculty of Graduate Studies. Completed applications should be sent to the Director of the Institute of Canadian Studies. The closing date for applications for University Fellowships (see page 344) is March 1.*

#### *Related Activities of the Institute*

The Institute of Canadian Studies sponsors and gives editorial supervision to the *Carleton Library*, a series of paperback reprints and compilations of classic material relating to Canadian history, law, economics, politics, anthropology, sociology, geography and journalism. There are forty-three volumes to date.

A new series, *Carleton Contemporaries*, launched in 1968, consists of original monographs and compilations focussing on the issues of the day — political, social, economic, cultural. It is designed to stimulate informed discussion of current and controversial issues and to improve the two-way flow of ideas between people and governments.

The Institute also sponsors a variety of public lectures and seminars. The most prominent of these is the "Living Tradition" series, now available in five volumes.



# School of International Affairs

Director of the School: H. Edward English, B.A., PH.D.

Assistant Director: John R. Nellis, M.A.

Professor of International Affairs: Lester B. Pearson

Professors of Strategic Studies (co-holders): Charles Foulkes, Johan J. Holst

Visiting Professor: Bastiaan van der Esch

Assistant Professor: A. R. M. Ritter

Research Fellow: Michael Morris

## *Committee of Management*

Davidson Dunton, President of the University

Gordon C. Merrill, Dean, Faculty of Arts

H. Edward English, Director, School of International Affairs

Adam Bromke (Soviet and East European Studies)

T. Murray Hunter (History)

N. Harvey Lithwick (Economics) (on leave of absence, 1969-70)

Peyton V. Lyon (Political Science)

Robert A. MacKay (Political Science)

Bruce A. McFarlane (Sociology)

J. George Neuspiel (Law)

Philip E. Uren (Geography)

Three student representatives are elected at the beginning of each academic year.

## *Associated Faculty*

Claude Ake (Political Science)

Jon Alexander (Political Science)

Duncan M. Anderson (Geography)

G. Peter Browne (History)

Richard L. Carson (Economics)

Ehsan Choudhri (Economics)

Gordon S. Couse (History)

Charles M. Dalfen (Political Science)

Dennis P. Forcese (Sociology)

Michael G. Fry (History) (on leave of absence, 1969-70)

Teresa M. Harmstone (Political Science)

Carl H. McMillan (Economics)

Khayyam Z. Paltiel (Political Science) (on leave of absence, 1969-70)

Harald von Riekhoff (Political Science)

George Roseme (Political Science)

D. R. Fraser Taylor (Geography)

Elliott L. Tepper (Political Science)

Norman M. Willis (History)

The School of International Affairs seeks to encourage and promote graduate study, research, public education and publication in the field of international affairs. Established in 1965 with the generous support of the Hon. Norman M. Paterson, a long-time member of the Board of Governors, the School offers a program of advanced studies leading to the degree of Master of Arts in International Affairs for persons preparing for careers in universities, government, business, journalism, and other spheres. The School is also concerned to stimulate research in international affairs, especially in such areas as Canada's external relations, political and economic integration, the developing countries, East-West relations, strategic studies, and international organizations. In addition to providing facilities for faculty research, it

## International Affairs

intends to establish a number of research professorships and fellowships, to promote publication, and to assist visiting specialists to take full advantage of the research potentialities of the national capital. The School also sponsors occasional special seminars, conferences and public lectures.

The School is administered by a Director and an interdepartmental Committee of Management composed of university officers, faculty members and student representatives concerned with teaching and research in international affairs. The School works in close association with the Committee on Soviet and East European Studies. Acting within the policies approved by the Committee of Management and subject to the general academic requirements laid down by the Faculty of Graduate Studies and the Senate, the Director administers the affairs of the School and co-ordinates the participation of the various interested departments. He has broad authority to recommend the admission of students and to approve their programs of study. He is also responsible for the research and publishing program of the School and for liaison with other centres for the study of international affairs.

## Master of Arts in International Affairs

### *Admission Requirements*

1. An Honours degree or its equivalent in History, Political Science or Economics, with at least good second class standing and *three* international affairs courses at least one of which should be *An Introduction to the History of International Relations* (History 24.380), or *International Politics* (Political Science 47.260), or *Theories of International Relations* (Political Science 47.360), or equivalents. Applications from persons with Honours degrees in other disciplines will be assessed on their merits. Candidates without the necessary courses in international affairs in their undergraduate program will have to take additional courses.
2. Candidates with a Pass degree in History, Political Science or Economics, with at least second class standing may be admitted to the qualifying year. They may, however, be required to take certain introductory courses in international relations not already taken. Applications from majors in other disciplines will be considered on their merits.
3. A working knowledge of French. In certain cases, candidates may be permitted to meet this requirement during their course, or to substitute another approved major language.

### *Qualifying Year*

A program selected with a view to providing students with the necessary background in more than one discipline for advanced study in international affairs.

Students who have not already completed a basic course in international relations must take at least one of *An Introduction to the History of International Relations* (History 24.380), *International Politics* (Political Science 47.260), or *Theories of International Relations* (Political Science 47.360). In addition, at least two other international affairs courses are normally required.

Students who have not completed a course in international economics will normally be required to take Economics 43.361\* and either 43.362\* or 43.363\* in the qualifying or final year. Those who have not taken any course in economic principles (the normal prerequisite of Economics 43.361\*) must satisfy the School that they are qualified to enter Economics 43.361\*.

The balance of courses may be chosen from related fields. A minimum average of B— is required to proceed to the Master's year.



*Master's Year*

1. *Three* approved graduate courses, including one of the *Interdisciplinary Seminars* (International Affairs 46.500, 46.505, or 46.510) and at least one other international affairs course.

2. A comprehensive oral examination to test the ability of the candidate to relate various disciplines to the study of international affairs.

3. A substantial thesis involving original research on an approved subject in the field of international affairs (equivalent to two courses). In certain circumstances, candidates may take another course and a research essay instead of submitting a thesis.

4. A B or better in each course taken for credit.

5. The ability to read and converse in French (or in certain cases a major language other than English or French) with moderate fluency. The oral French requirement may be met by successfully completing French 20.201\*.

While the minimum residence requirement of the School is one winter session, the interdisciplinary nature of the program means that most students require a summer session either preceding or following the academic year.

**Doctor of Philosophy in Political Science or Economics**

Although the School does not offer a doctorate in International Affairs, students may study for the degree of Doctor of Philosophy in Political Science or Economics with emphasis on international relations. (See pp. 117-118 for Economics and pp. 269-271 for Political Science requirements.)

**Course Offerings****International Affairs 46.500** International Integration

The study of political, economic, and social integration of nations, with particular emphasis currently on Western Europe and North America.

*Day Division:* 1969-70 (seminar three hours a week).

**International Affairs 46.505** Political and Economic Development

The study of the principles and problems of development in the less industrially advanced regions of the world.

*Day or Evening Division:* 1969-70 (seminar three hours a week).

**International Affairs 46.510** International Relations in Eastern Europe

The study of the interrelationships among the socialist countries of Eastern Europe and their foreign policies toward other countries.

*Day or Evening Division:* 1969-70 (seminar three hours a week).

**International Affairs 46.520\* and 46.521\*** Studies in Strategy and Security

Selected topics on the theory and practice of strategy and peace-keeping.

Lectures and seminars three hours a week.

**International Affairs 46.525\* 46.526\* 46.527\*** Problems in International Affairs

Lectures and seminars in selected topics.

**International Affairs 46.598** Research Essay

*Day and Evening Division:* 1969-70 (tutorial hours arranged).

**International Affairs 46.599** M.A. Thesis

*Day and Evening Division:* 1969-70 (tutorial hours arranged).



## International Affairs

The following additional international affairs courses are offered by the participating departments — for course descriptions, see departmental listings.

International Economics (Economics 43.361\*)

International Monetary Problems (Economics 43.362\*)

Economic Development (Economics 43.363\*)

International Trade (Economics 43.460)

Diplomacy of the Great Powers, 1789-1890 (History 24.280)

Diplomacy of the Great Powers, 1890-1945 (History 24.380)

Canada-United States Relations (History 24.334)

Diplomatic and Strategic Problems of the Second World War (History 24.481)

Public International Law (Law 51.463)

International Politics (Political Science 47.260)

Theories of International Relations (Political Science 47.360)

International Institutions (Political Science 47.460)

Canada in World Affairs (Political Science 47.560)

American Foreign Policy (Political Science 47.565)

Soviet-American Relations (Political Science 47.570)

Africa and Asia in World Affairs (Political Science 47.580)

Contemporary International Politics (Political Science 47.585)

Tutorial in Selected Field (Political Science 47.590)

Sociology of International Relations (Sociology 53.587\*)

### *Related Courses*

The Economics of Socialism (Economics 43.370)

Economic Development (Economics 43.456\*)

Comparative Economic Systems (Economics 43.470)

Europe (Geography 45.250)

Inter-tropical Africa (Geography 45.330)

Soviet Union (Geography 45.360\*)

East Europe (Geography 45.361\*)

Problems of African Development (Geography 45.530\*)

Selected Studies in the Human Geography of Arctic and Sub-Arctic Lands (Geography 45.531\*)

History of Russia and the U.S.S.R. (History 24.260)

Liberty and Authority in Modern France (History 24.316)

German Unity and Nationality (History 24.318)

History of Eastern Europe (History 24.365)

Selected Problems in Russian History (History 24.460)

Government and Politics in Western Europe (Political Science 47.210)

The Politics of Developing Areas (Political Science 47.310)

Soviet Government and Politics (Political Science 47.320)

Modern Political Thought (Political Science 47.333, or 47.430)

Comparative Government (Political Science 47.505)

Nationalism (Political Science 47.520)

Comparative Public Administration (Political Science 47.545)

Social Change and Modernization (Sociology 53.360)

For additional courses, see departmental listings.

# Details of Courses

The course numbering pattern is, in general, as follows:

- 010-099 Courses usually taken in the Qualifying University year.
- 100-199 Courses usually taken in the First year.
- 200-299 Courses usually taken in the Second year.
- 300-399 Courses usually taken in the Third year.
- 400-499 Courses ordinarily taken in Fourth year Engineering, Fourth and Fifth years Architecture, and Fourth year (Honours) Arts and Science.
- 500-599 Courses ordinarily taken by Graduate students.

N.B. Half courses are marked with an asterisk (with the exception of Engineering half courses).

A listing of discontinued courses is available upon request to the Office of the Registrar, Carleton University.

Each course number is prefixed by the number of the Department or School under whose auspices the course is offered. *At the time of registration, advisers and students are required to make certain that both the prefix and the course number for each course in which registration is sought are clearly indicated on the face of the registration form.*

## Department Numbers

Dept.	Dept.
No. Department	No. Department
10 . . . Interdisciplinary Humanities	52 . . . School of Social Work
11 . . . Art	53 . . . Sociology
12 . . . Canadian Studies	54 . . . Anthropology
13 . . . Classical Civilization	55 . . . Soviet and East European Studies
14 . . . Classics	60 . . . Interdisciplinary Sciences
15 . . . Greek	61 . . . Biology
16 . . . Latin	65 . . . Chemistry
17 . . . Comparative Literature	67 . . . Geology
18 . . . English	69 . . . Mathematics (Pass)
20 . . . French	70 . . . Mathematics (Honours)
22 . . . German	75 . . . Physics
24 . . . History	76 . . . Architecture Division A
26 . . . Italian	77 . . . Architecture Division B
28 . . . Journalism	78 . . . Architecture Division C
30 . . . Music	79 . . . Architecture Division D
32 . . . Philosophy	80 . . . Architecture Division E
34 . . . Religion	81 . . . Applied Mechanics
36 . . . Russian	82 . . . Structural Analysis and Design
38 . . . Spanish	83 . . . Soil Mechanics
40 . . . Interdisciplinary Social Sciences	84 . . . Transportation
41 . . . Accounting	86 . . . Materials
43 . . . Economics	87 . . . Mechanical Analysis and Design
45 . . . Geography	88 . . . Mechanical Systems
46 . . . International Affairs	89 . . . Fluid Mechanics
47 . . . Political Science	90 . . . Thermodynamics and Heat Transfer
49 . . . Psychology	
51 . . . Law	93 . . . Electrical and Electronic Circuits

**Details of Courses**

*Department Numbers*

Dept. No.	Department	Dept. No.	Department
94 . . .	Communication and Control Systems	97 . . .	Electromagnetics
95 . . .	Computer and Switching Systems	98 . . .	Electrical Machines and Power Systems
96 . . .	Solid State Devices	99 . . .	Engineering Projects and Theses

# Interdisciplinary Courses

## Humanities 10.100

An examination of selected works, from Biblical times to the present, illustrating the various dominant views on the nature of man and his attempts to understand himself and the world about him.

*Day Division:* Annually (lectures three hours a week; discussion groups once every two weeks).

*A. R. Gualtieri (co-ordinator), J. A. Brook, N. E. S. Griffiths, D. Keith*

## Social Science 40.250 Aspects of Twentieth Century Living

This course will study one or more problems or aspects of modern living, as determined by the faculty and students participating. It will be entirely structured by those involved, with the aid of an advisory board of faculty members, and it will be administered by the Education Commission of the Students' Council, with the aid of the same advisory board.

*Day Division:* 1969-70 (sessions to take various forms, at least two hours a week).

*Prerequisite:* Second year standing or higher.

## Social Science 40.487 Interdisciplinary Research Seminar, Aspects of Urban Studies

An interdisciplinary course for Honours students, involving the active participation of at least three departments. There will be an examination of various aspects of urban analysis and the main concern will be a substantial research project, subject to the supervision of the various faculty members.

*Prerequisite:* Enrolment in an Honours program in one of the participating departments, or the permission of the instructors.

*Not offered, 1969-70.*

## Science 60.100

This course is designed to acquaint students in the Arts, Humanities, and Social Sciences with the methodology of science. Beginning with a general description of the aims, objects, and methods of the experimental sciences, the course will examine a series of case histories of scientists, their place in the philosophical and intellectual milieu of their time, and their contributions to the development of scientific concepts and an interpretation of the natural world.

*Day Division:* Annually (lectures three hours a week).

*H. H. J. Nesbitt and Margaret D. Bell*

## Science 60.400 Topics in the History and Philosophy of Science

An introduction to philosophical issues of importance to understanding science, a survey of historical origins of modern science; readings on the sociological structure of science and the relationship of science to contemporary society. The course is intended for Honours students in the Fourth year.

*Prerequisite:* Recommendation of the major department and permission of the instructor.

*Day Division:* 1969-70 (one two-hour seminar a week plus guest lecturers to be arranged).

*C. H. Langford and lecturers*



# Accounting

Associate Professors

R. Caterina, W. R. Scott,

J. B. Waugh (on leave of absence, 1969-70)

Assistant Professor

L. N. Ledohowski

Sessional Lecturers

P. J. Faulkner, A. B. Larose, N. G. Ross, G. P. Wilson

Accounting is basically communication—communication of the results of business activity to interested parties such as shareholders, investors, statisticians, governments; and also communication to business management of the information needed to aid in managing the enterprise.

As firms continually become larger and more complex, the need for information on financial position and results of operations becomes greater and at the same time this information becomes more difficult to obtain and interpret.

A knowledge of the means by which the accounting process records and summarizes transactions and attempts to present the results in a meaningful manner is necessary to anyone who uses or relies on financial statements.

Students who, after achieving the B.Com. degree, intend to proceed to professional accounting designations—Chartered Accountant (C.A.), Certified General Accountant (C.G.A.), or Registered Industrial Accountant (R.I.A.)—should consult Professors Caterina or Scott before entering the Third year of the Commerce course.

## **Accounting 41.100** An Introduction to Accounting

Accounting method; concepts of income determination and asset valuation; accounting information and managerial decisions.

*Text:* Gordon and Shillinglaw: *Accounting: A Management Approach*.

*Day Division:* Annually (lectures and problems three hours a week).

*Evening Division:* Annually (lectures three hours a week; bi-weekly problem periods).

*Members of the Department*

## **Accounting 41.200** Intermediate Accounting

Further development of problems of revenue recognition and asset valuation; flow-of-funds analysis; financial statement analysis; topics from managerial accounting.

*Prerequisite:* Accounting 41.100.

*Day Division:* Annually (lectures and problems three hours a week).

*Evening Division:* Annually (lectures and problems three hours a week).

*Members of the Department*

## **Accounting 41.301\*** Forms of Business Organization: The Accounting Implications

Consideration of the accounting problems associated with specific types of organizational form. Topics will include: partnerships; branch operations; mergers, amalgamations and reorganizations; consolidations; reporting for decentralized operations.

*Prerequisite:* Accounting 41.200.

*Day Division:* 1969-70 (lectures three hours a week, first term).

## **Accounting 41.306\*** Financial Reporting Problems

Discussion and analysis of selected problems relating to the presentation and interpretation of accounting information on financial position and operating performance. Material for discussion will be drawn from real situations, and from cases.

*Prerequisite:* Accounting 41.200.

*Day Division:* 1969-70 (lectures two hours a week, second term).



## **Accounting**

### **Accounting 41.325\* Cost Accounting**

The use of accounting information for purposes of cost control and performance evaluation. Topics will include: analysis and control of elements of cost; design and use of job order, process cost and standard cost systems; analysis of cost variances; variable costing.

*Prerequisite:* Accounting 41.200.

*Evening Division:* 1969-70 (lectures two hours a week, first term).

### **Accounting 41.326\* Budgeting**

Discussion of the role of accounting in the functional areas of forward planning, performance evaluation, and the control of operations. Special attention will be given to the problems of forecasting and long-range planning.

*Prerequisite:* Accounting 41.200.

*Evening Division:* 1969-70 (lectures two hours a week, second term).

### **Accounting 41.340 Government Accounting and Finance**

A comprehensive analysis of government financial and budgeting concepts and procedures, including program and performance budgeting, costing, long-term planning, accounting, auditing and control. Canadian budgeting practices will be compared with those of Britain and the United States. (See Political Science p. 274).

*Evening Division:* 1969-70 (lectures two hours a week).

*N. G. Ross and G. P. Wilson*

### **Accounting 41.365 Computer Technology Applied to Commerce Problems**

Introduction to digital computer organization and operations. Programming techniques, stressing the use of FORTRAN IV and COBOL. Numerical solution to problems of interest in social and management sciences. Simulation of business problems and the use of business strategies. (This course is also listed as Economics 41.365).

*Prerequisites:* Mathematics 69.101 and Economics 43.220, or permission of the instructors.

*Evening Division:* 1969-70 (lectures two hours a week, laboratory two hours a week).

### **Accounting 41.400 Accounting Theory**

A study of the evolution of accounting theory and practices, leading to an analysis of current developments and areas of controversy.

*Prerequisite:* Accounting 41.200.

*Day Division:* 1969-70 (lectures two hours a week).

# Architecture

Professor;

Director of the School

Douglas Shadbolt

Associate Professor

A. M. Mozier

Assistant Professors

W. S. Cope, G. D. Milne

Candidates for the Bachelor of Architecture degree are required to complete a program of studies covering five years after Senior Matriculation. The admission requirements and programs of study for each of the five years are outlined on pp. 63-65. Courses marked (†) will be offered in the 1969-70 session. The balance of the courses described will not be available until subsequent years.

## **Architecture 76.100† Colloquium I**

Colloquium I is a two-year sequence of lectures on the theme "Man and Environment" to be given by faculty and selected visitors from a wide range of disciplines to the combined First and Second year. Students in the First year register in 76.100. The lectures will be supplemented by reading assignments and weekly seminar-discussions in small groups in which individuals and groups will have specific responsibilities for preparation of material for discussion. Topics will include thermal, luminous, sonic and aqueous environments and their perception; the body as an environmental control device; ecological balance, territoriality, proxemics, demography, conservation, pollution etc. and draw on the disciplines of: physiology, biology, ecology, physics, psychology, psychiatry, geography, sociology, anthropology, history, literature and architecture, etc.

*Day Division:* Annually (one two-hour lecture, two hours seminar-discussion a week).  
*G. D. Milne and others*

## **Architecture 76.200† Colloquium I**

See 76.100 for description. Students in Second year register in 76.200.

## **Architecture 76.300 Colloquium II**

Colloquium II is a two-year sequence of lectures similar to Colloquium I, but the theme will be "Man and Community", and the course will be given to the combined Third and Fourth years. Students in the Third year register in 76.300.

*Day Division:* Annually (one two-hour lecture, two hours seminar-discussion a week).

## **Architecture 76.400 Colloquium II**

See 76.300 for description. Students in Fourth year register in 76.400.

## **Architecture 76.450 Colloquium III**

Similar format to Colloquium I and II, but the theme will be "Man and the City" and the lecture sequence will be completed in one year.

*Day Division:* Annually (one two-hour lecture, two hours seminar-discussion a week).

## **Architecture 77.100 Environmental Controls I**

First year of a two-year course sequence which should provide an understanding of basic properties and principles of heat, light and sound, their application in the design of environmental control devices, their interaction with the human body and the natural environment to produce functional, comfortable, and practical building environments. The course content builds on lectures in 76.100, and will be illustrated extensively by the use of demonstration models.

*Day Division:* Annually (lectures two hours a week).

*W. S. Cope and others.*

## Architecture

### **Architecture 77.200†** Environmental Controls II

Continuation of 77.100 at more advanced level. Application of course material will be made in experimental models designed and built in course 80.200.

*Day Division:* Annually (lectures two hours a week).

*W. S. Cope and others.*

### **Architecture 77.120†** Structures I

The first year of a two-year course sequence which should provide an understanding of theory and principles of statics and mechanics, strength of materials, their application to the design of wood, steel and concrete structures, and a descriptive understanding of the range of choice and criteria for selection of structural systems. Demonstration models and audio-visual aids will be used extensively to illustrate systems and principles and provide the basis for both quantitative and qualitative understanding of structures.

*Day Division:* Annually (lectures three hours a week, problems three hours a week).

*Lecturer to be announced*

### **Architecture 77.220†** Structures II

Continuation of 77.120. Further application of course material will be made in experimental models designed and built in course 80.200.

*Day Division:* Annually (lectures three hours a week, problems three hours a week).

*Lecturer to be announced*

### **Architecture 79.100†** Computations I

First year of a two-year course sequence combining selected topics in Mathematics including set theory, probability and statistics, matrix algebra, analytical geometry, integral and differential calculus, with, in addition an introduction to methods and techniques in Computer Science including digital computation, programming and computer graphics. Problems and exercises will develop applications to architectural and design problems.

*Day Division:* Annually (lectures two hours a week, problems two hours a week).

*Lecturer to be announced*

### **Architecture 79.200†** Computations II

*Day Division:* Annually (lectures two hours a week, problems two hours a week).

*Lecturer to be announced*

### **Architecture 80.100†** Studio Workshop I

This course will be concerned with the development of the student's perceptual, conceptual, creative and communicative skills and knowledge to be used in analysis and synthesis of aspects of the physical, social and information environments. Studio problems cover all phases of Architectural programming, design, construction, and user evaluation at an introductory level. Seminars and lectures by Faculty and visitors from relevant technical and social disciplines will supplement the studio work.

*Day Division:* Annually (nine hours studio/workshop a week).

*G. D. Milne and others*

### **Architecture 80.200†** Studio Workshop II

This course will be concerned with the application of design methodology to the integration of structure, environmental control devices, and construction. Full scale mockups of single-cell unit-spaces will be designed, built and tested under field

conditions, evaluated for performance, modified and retested, etc. Parallel studies on models will explore visual, formal and geometric properties of combinations of cellular units. These studies will lead to further models and mockups to study structural, fabrication and assembly implications which will serve as an introduction to studies of specific building-types in succeeding years.

*Day Division:* Annually (twelve hours studio/workshop a week).

*W. S. Cope and others.*

### **Architecture 80.300 Studio Workshop III**

The third studio/workshop will study housing, education and health facilities. Faculty of all divisions of the School will be called upon as resource persons for specific information and guidance or leads to other sources of relevant information.

*Day Division:* Annually (fifteen hours studio/workshop a week).

### **Architecture 80.400 Studio Workshop IV**

Continuation of 80.300, but students may study commercial and transportation facilities in addition to those for housing, education and health.

*Day Division:* Annually (fifteen hours studio/workshop a week).

### **Architecture 80.450 Studio Workshop V**

The fifth studio/workshop will be spent on a study of a problem of the students choice. During the second term, the student, in addition to completing the project, will develop a thesis on a particular subject area within the context of the term project.

*Day Division:* Annually (twenty hours studio/workshop a week).



# Art

Assistant Professors	Mary-Louise Funke Clifford M. Brown
Sessional Lecturer	David Silcox
Studio Demonstrator	Jack Macgillivray

The Department's primary emphasis is on art history, the study of art and architecture as tangible evidence of aspects of man's creative achievements. The offerings of the Department are intended to complement work in the humanities and not to provide professional training in the studio aspects of Art.

## Major in Art

A major in Art comprises Art 11.100 and four other courses in Art to be chosen in consultation with the Department. Students who are specifically interested in art history are encouraged to support their minor or combined major with either Classics, History, Languages (Literature) or Philosophy. Others may want to choose from Music, Religion or the Social Sciences.

A combined major in Art and another subject will include at least four courses in Art.

### Art 11.100 Introduction to the History of Art

This course will provide a general approach to the main principles governing the character of Occidental art through the ages. Emphasis is placed on the analysis of painting, sculpture and architecture, and, where applicable, on the decorative arts, explaining problems and attitudes that were typical for major periods. Examples from pre-history to contemporary art will be used.

*Day Division:* Annually (lectures three hours a week, studio work 12 hours the year).  
*Mary-Louise Funke*

### Art 11.220 European Art of the Middle Ages

The developments from late Antiquity to Gothic art will be studied with a view to the stylistic characteristics in the architecture, sculpture, decorative arts and manuscripts of the various periods.

*Prerequisite:* Art 11.100 or equivalent.

*Day Division:* 1969-70 (lectures three hours a week).

*Clifford M. Brown*

### Art 11.230 European Art of the Renaissance

This assessment of the major developments in the arts of the fourteenth to the sixteenth centuries in Italy and northern Europe will give particular attention to new art theories, important personalities and works of art originating from this period.

*Prerequisite:* Art 11.100 or equivalent.

*Day Division:* 1969-70 (lectures three hours a week).

*Clifford M. Brown*

### Art 11.240 European Art from 1600 to 1750

Major contributions to the baroque and classical principles in architecture, sculpture, painting and the minor arts will be examined. Particular emphasis will be placed on Bernini, Velazquez, Rubens, Rembrandt, and Wren. The course will conclude with a study of rococo phenomena.

*Prerequisite:* Art 11.100 or equivalent.

*Day Division:* 1969-70 (lectures three hours a week).

*Mary-Louise Funke*



## Art

### **Art 11.250** European Art from 1750 to 1890

A study of the development of the visual arts in Western Europe and certain aspects of North America to assess the evolution from the classical theory of beauty, proclaimed for example by Reynolds and David, through that of exponents of Romanticism, Realism, Impressionism and post-Impressionism. The course concludes with art theories of the Fin-du-siècle.

*Not offered, 1969-70.*

### **Art 11.260** Twentieth Century Art

This course will attempt to touch on the various facets of contemporary art in Europe and North America.

*Prerequisite:* Art 11.100 or equivalent.

*Day Division:* 1969-70 (lectures three hours a week).

*David Silcox*

### **Art 11.310** Canadian Art

A study of the evolving art scene in Canada from the 17th century to the present. While the course is concerned primarily with painting, some examination will be made of woodcarving and sculpture, architecture and the minor arts. Canadian developments will be discussed in the context of movements in Europe and America.

*Not offered, 1969-70.*

### **Art 11.330** Studies in the Renaissance

An intensive study of selected Renaissance artists. The particular problems and personalities will be determined by the lecturer.

*Not offered, 1969-70.*

### **Art 11.350** Nineteenth Century Studies (Romanticism)

An intensive study of selected 19th century artists. The particular problems and personalities discussed will be determined by the lecturer.

*Prerequisite:* Art 11.100 or equivalent.

*Day Division:* 1969-70 (lectures three hours a week).

*Mary-Louise Funke*

See also:

*Classical Civilization 13.330, Classical Art and Archaeology*

*Philosophy 32.240, Aesthetics.*

# Biology

Professor; Chairman  
of the Department  
Professors

F. Wightman  
H. F. Howden, V. N. Iyer (on leave of absence,  
1969-70), H. H. J. Nesbitt, G. Setterfield  
C. A. Barlow, W. I. Illman, K. W. Joy, P. E. Lee,  
H. G. Merriam, D. A. Smith (on leave of absence,  
1969-70), J. A. Webb

Assistant Professor, and  
Curator of the Herbarium  
Assistant Professors

Isabel L. Bayly  
T. W. Betz, G. R. Carmody, M. B. Fenton,  
Jean P. Fletcher, D. R. Gardner, S. L. Jacobson,  
J. D. H. Lambert, Margaret E. McCully, J. Sinclair,  
H. Yamazaki

Adjunct Professors  
Sessional Lecturer  
Senior Demonstrators

E. L. Bousfield, D. G. Harcourt, D. M. Wood  
Elizabeth M. Arnason  
Margaret Brasch, Mary-Lou Florian, Lynn Grey,  
Ann Hutton, Eliezer White

Teaching Fellows  
Postdoctorate Fellows

K. Brasch, R. B. Goldberg, G. P. Reilly  
M. E. Ahmed, Ann Allaway, W. Allaway, A. Erez,  
E. Pahlich, Elnora Schneider, R. P. Sinha

Visiting Research Fellow  
Curator of Greenhouses

M. I. Timonin  
H. Datema

## General

Students intending to major in Biology are strongly advised to acquire a good background in Chemistry and Physics at the Grade 13 or equivalent level.

## Undergraduate Programs

Students reading for an Honours degree or a major in Biology must arrange their courses, in consultation with the Chairman of the Department, in one of the patterns outlined below.

In choosing additional science courses, students may select courses offered by the Departments of Chemistry, Geology, Mathematics and Physics, and from the following courses offered by the Department of Psychology: Psychology 49.200\*/49.201\*, 49.205\*/49.206\*, 49.220\*/49.221\*, 49.222\*/49.321\*, 49.270\*/49.271\*, 49.420, 49.470.

The programs outlined below offer excellent preparation for professional training in medical, dental and related schools, but no guarantee of automatic entry. A candidate anticipating such studies should plan the details of his program in consultation with the dean of the professional faculty of his choice and with the Chairman of the Department.

## Major in Biology

### *B.Sc. Program*

Students reading for a Bachelor of Science degree with a major in Biology must satisfy the general requirements for Science stated on pp. 51-53 and take the following fifteen courses in a pattern approved by the Chairman:

1. Biology 61.100, 61.205, 61.210, 61.215, 61.340 and 61.360
2. Chemistry 65.100, Physics 75.100 or 75.105 and Mathematics 69.100 or 69.101
3. Two additional science courses above the 100 level and not in Biology; Chemistry 65.222 and/or Mathematics 69.250 are strongly recommended.
4. One additional science course
5. Three approved courses in the Faculty of Arts.

## **Biology**

### *B.A. Program*

Students who plan to read for a Bachelor of Arts degree with a major in Biology must satisfy the general requirements for Arts stated on pp. 21-27, and take the following fifteen courses in a pattern approved by the Chairman:

1. Biology 61.100, 61.205, 61.210, 61.215, 61.340 and 61.360
2. Chemistry 65.105
3. One additional science course not in Biology; either Chemistry 65.222 or Mathematics 69.250 are strongly recommended
4. Four approved courses in the Faculty of Arts
5. Three additional courses at an advanced level

### **Honours B.Sc. Program**

Students planning a professional career in Biology are strongly advised to enter the Honours program as soon as possible, and certainly by the end of the Second year. An Honours degree is almost essential for admission to graduate studies. Students reading for an Honours B.Sc. degree in Biology must satisfy the general requirements for Honours stated on pp. 13 and 52 and take the following twenty courses in a pattern approved by the Chairman:

1. Biology 61.100, 61.205, 61.210, 61.215, 61.340, 61.360 and 61.498
2. Chemistry 65.100, Physics 75.100 or 75.105 and Mathematics 69.100 or 69.101
3. Two additional science courses above the 100 level and not in Biology; Chemistry 65.222 and/or Mathematics 69.250 are strongly recommended
4. Five additional courses, at least four of which must be science courses at an advanced level. These courses should be selected in consultation with the Chairman or a faculty member working in a field of Biology close to the student's own interest
5. Three approved courses in the Faculty of Arts

Honours students should attend a one-week Field Biology Course arranged by the Department at the beginning of their Third or Fourth Year. With the consent of the Chairman, however, equivalent experience, acquired for example at an approved biological station, may be substituted. Honours students must also pass an oral comprehensive examination at the end of their Fourth year and demonstrate a reading knowledge of French, German or Russian. Fourth year students are strongly urged to attend the weekly departmental research seminars.

Students wishing to obtain the Ontario College of Education Interim High School Assistant's Certificate, Type A, are advised to consult the Chairman as soon as possible in their university career in order that an appropriate Honours program may be arranged.

### **Graduate Studies**

The Department of Biology offers programs of study and research leading to M.Sc. and Ph.D. degrees in Molecular and Cellular Biology, Plant and Animal Physiology, Ecology and Systematics. The Department has a co-operative agreement with the Research Branch, Canada Department of Agriculture and the National Museum of Natural Sciences in Ottawa. This permits members of the scientific staff of these institutions to assist graduate students with particular research projects, subject to the approval of the individuals and departments concerned.

Candidates for graduate degrees must satisfy the general requirements of the Faculty of Graduate Studies stated on pp. 67 and 68. In addition, and depending upon their chosen field of research, candidates may be required to demonstrate a reading knowledge of one or more languages other than English.

All candidates for the Ph.D. degree must pass an oral comprehensive examination before submission of a thesis.

During the period of residence, all graduate students are expected to attend, and make some contribution to, the weekly departmental research seminars.

### **Biology 61.100** Introductory Biology

An introductory lecture and laboratory course on the fundamental principles of biology, to include molecular and cell biology, structure and physiological processes in animals and plants, population and environmental biology.

*Text:* To be announced.

*Day and Evening Divisions:* Annually (lectures three hours a week, laboratory four hours a week).

*C. A. Barlow, Jean P. Fletcher, D. R. Gardner, S. L. Jacobson, K. W. Joy, J. D. H. Lambert, P. E. Lee, Margaret McCully, and J. A. Webb*

### **Biology 61.205** Animal Morphology

Classification, functional morphology, development and evolution of the major animal groups.

*Texts:* Barnes, *Invertebrate Zoology*.

Romer, *The Vertebrate Body*.

*Prerequisite:* Biology 61.100.

*Day Division:* Annually (lectures three hours a week, laboratory four hours a week).

*Jean P. Fletcher and H. H. J. Nesbitt*

### **Biology 61.210** Plant Morphology

A course on the morphology, reproduction, and historical evolution of plants.

*Text:* Scagel et al., *An Evolutionary Survey of the Plant Kingdom*.

*Prerequisite:* Biology 61.100.

*Day Division:* Annually (lectures two hours a week, laboratory four hours a week).

*W. I. Illman and Margaret McCully*

### **Biology 61.215** Genetics

A lecture and laboratory course on the mechanisms of inheritance and the nature of gene structure, composition and function.

*Text:* To be announced.

*Prerequisite:* Biology 61.100.

*Day Division:* Annually (lectures two hours a week, laboratory four hours a week).

*G. R. Carmody*

### **Biology 61.340** Physiology

A lecture and laboratory course on the fundamental principles of plant and animal physiology.

*Texts:* To be announced.

*Prerequisites:* Biology 61.100 and Chemistry 65.100 or 65.105. It is strongly recommended that Chemistry 65.222 be taken prior to or concurrent with this course.

*S. L. Jacobson and K. W. Joy*

### **Biology 61.350** Introductory Biochemistry

Chemistry and metabolism of biological compounds. Properties and functions of enzymes. Control of metabolism.

*Text:* To be announced.

*Prerequisites:* Biology 61.100 and Chemistry 65.220 or 65.222.

*Day Division:* Annually (lectures two hours a week, laboratory four hours a week).

*H. Yamazaki*

## **Biology**

### **Biology 61.360 Ecology**

A lecture and laboratory course on the principles of plant and animal ecology.

*Text:* To be announced.

*Prerequisites:* Biology 61.205 and 61.210.

*Day Division:* Annually (lectures two hours a week, laboratory and seminars four hours a week).

*J. D. H. Lambert and H. G. Merriam*

### **Biology 61.380 The Flora and Fauna of Canada**

An introduction to practical taxonomy and biogeography through field and laboratory study of representative Canadian plants and animals with emphasis on local forms. Each student must make collections of plants and animals during the summer before the course is taken. Detailed directions may be obtained from the instructors.

*Prerequisites:* Biology 61.205 and 61.210.

*Day Division:* Annually (lectures two hours a week, laboratory four hours a week).

*Members of the Department*

## **Honours Courses**

### **Biology 61.400 Phycology and Mycology**

A course on the morphology, evolution, and biological importance of the algae and fungi.

*Text:* Smith, *Cryptogamic Botany*, Vol. I.

*Prerequisite:* Biology 61.210.

*Day Division:* 1970-71 and alternate years (lectures two hours a week, laboratory four hours a week).

*W. I. Illman*

### **Biology 61.405 Invertebrate Zoology**

An advanced course on the classification, morphology, comparative physiology and evolution of invertebrate animals.

*Reference texts:* Grassé, *Traité de Zoologie*, appropriate volumes.

Hyman, *The Invertebrates*.

*Prerequisites:* Biology 61.205 and 61.215.

*Day Division:* 1970-71 and alternate years (lectures two hours a week, laboratory four hours a week).

*Members of the Department*

### **Biology 61.415 Chordate Zoology**

An advanced course on the classification, geographic distribution and evolution of the major groups of chordates. As part of his practical work, each student must make a collection of chordates, preferably during the summer before the course is taken. Detailed directions may be obtained from the instructor.

*Texts:* Colbert, *Evolution of the Vertebrates*.

Orr, *Vertebrate Biology*.

*Prerequisite:* Biology 61.205.

*Day Division:* 1969-70 and alternate years (lectures two hours a week, laboratory four hours a week).

*M. B. Fenton*



**Biology 61.420 Cytology**

A study of the structure, composition and function of cells at the microscopic and macro-molecular levels. Training will be given in techniques of light microscopy, photomicrography, electron microscopy, autoradiography and cell fractionation.

*Text:* Selected references.

*Prerequisites:* Biology 61.215, a course in physiology or biochemistry and consent of the instructor. Enrolment limited.

*Day Division:* 1969-70 and alternate years (lectures and seminars three hours a week, laboratory four hours a week).

*G. Setterfield and P. E. Lee*

**Biology 61.425 Plant Physiology**

A lecture and laboratory course on the physiology and biochemistry of seed germination, growth and development in higher plants.

*Text:* To be announced.

*Prerequisites:* Biology 61.340 and Chemistry 65.220 or 65.222.

*Day Division:* Annually (lectures two hours a week, laboratory four hours a week).

*F. Wightman and J. A. Webb*

**Biology 61.430 Microbiology and Plant Pathology**

A lecture and laboratory course on the general principles and practice of microbiology and plant pathology; consideration will be given to the metabolism and biology of bacteria and fungi, the purification and properties of viruses and to the relationship of viruses, bacteria and fungi to their host cells.

*Text:* To be announced.

*Prerequisites:* Chemistry 65.220 or 65.222 and Biology 61.340 at least concurrently.

*Evening Division:* 1969-70 (lectures two hours a week, laboratory four hours a week).

*Lecturer to be announced*

**Biology 61.435 Animal Physiology**

A study of the general principles underlying the functional activities of cells, tissues, organs, and the intact body of a wide variety of animals.

*Text:* Reference list to be assigned.

*Prerequisites:* Biology 61.340, Chemistry 65.220 or 65.222, and Physics 75.100 or 75.105.

*Day Division:* Annually (lectures two hours a week, laboratory four hours a week).

*D. R. Gardner and J. Sinclair*

**Biology 61.440 Taxonomy of the Flowering Plants**

A general survey of the flowering plants, the bases for classification and the history of taxonomy. A project will be assigned.

*Text:* Lawrence, *Taxonomy of Vascular Plants*.

*Prerequisite:* Biology 61.210.

*Day Division:* 1969-70 and alternate years (lectures two hours a week, laboratory four hours a week).

*Isabel Bayly*

**Biology 61.455 Embryology**

A lecture and laboratory course on the descriptive and experimental principles of chordate embryology.

*Text:* Balinsky, *An Introduction to Embryology*.



## **Biology**

*Prerequisite:* Biology 61.205, or consent of the instructor.

*Day Division:* 1969-70 and alternate years (lectures three hours a week, laboratory four hours a week).

*T. W. Betz*

### **Biology 61.460 Entomology**

A course on the morphology of representatives of the more important orders and families of insects.

*Text:* Duporte, *Manual of Insect Morphology*.

*Reference Text:* Snodgrass, *Principles of Insect Morphology*.

*Prerequisite:* Biology 61.205.

*Day Division:* 1969-70 and alternate years (lectures two hours a week, laboratory four hours a week).

*Elizabeth Arnason*

### **Biology 61.465 Quantitative Ecology**

Quantitative and qualitative analyses of the distribution and abundance of plant and animal species and communities, and of related environmental phenomena.

Immediately prior to the fall term, each student who has not already done so should attend the departmental field course illustrating important principles and techniques which cannot be demonstrated in brief laboratory sessions. Further information is available from the instructors.

*Prerequisite:* Biology 61.360.

*Day Division:* Annually (lectures two hours a week, laboratory four hours a week).

*C. A. Barlow, J. D. H. Lambert and H. G. Merriam*

### **Biology 61.470 Evolution and Biogeography**

The biological aspects of time, space and distance. This involves processes of change, selection, speciation, and the development of biotas and their geographic differences.

*Text:* To be announced.

*Prerequisites:* Biology 61.360 or permission of the instructor.

*Day Division:* Annually (lectures two hours a week, laboratory four hours a week).

*H. F. Howden*

### **Biology 61.475 History of Biology**

A seminar course on the history of biology and biological theory.

*Prerequisites:* Biology 61.215, a course in physiology at least concurrently and permission of the instructor.

*Day Division:* 1969-70 and alternate years.

*H. H. J. Nesbitt*

### **Biology 61.485 Principles of Systematic Zoology**

A course devoted to an intensive study of the principles and methods of animal classification. In the laboratory periods, different animal groups will be studied in different years, e.g., insects in 1968-69.

*Prerequisite:* Permission of the Department.

*Day Division:* 1970-71 and alternate years.

### **Biology 61.490 Directed Special Studies and Seminar**

*Day Division:* Annually.

*Members of the Department*

**Biology 61.498** Research Project

Fourth Year Honours students must carry out a research project under the supervision of a member of the Department.

**Graduate Courses****Biology 61.500** Molecular Genetics

A discussion of recent advances and current physico-chemical approaches to the problems of gene organization and function. Seminars and problems.

*V. N. Iyer and H. Yamazaki*

**Biology 61.505** Plant Morphogenesis

A course dealing with problems of the development of plants from single cells to complex multicellular organisms.

*Prerequisite:* Biology 61.210.

*Day Division:* 1970-71 and alternate years (lectures two hours a week, laboratory four hours a week).

*Margaret McCully*

**Biology 61.510** Virology

Transmission of viruses by arthropods, the purification of viruses and their relationship to host cells.

*Prerequisites:* Biology 61.350 and permission of the instructor.

*P. E. Lee*

**Biology 61.520** Advanced Cytology

An analysis of recent developments in the study of cell structure and function.

*Prerequisite:* Biology 61.420.

*G. Setterfield and P. E. Lee*

**Biology 61.525** Plant Physiology

An advanced course in plant physiology.

*Prerequisite:* Biology 61.425, or permission of the instructors.

*F. Wightman, J. A. Webb and K. W. Joy*

**Biology 61.530** Plant Biochemistry

An advanced course in plant biochemistry.

*Prerequisite:* Biology 61.425, or permission of the instructors.

*F. Wightman, J. A. Webb and K. W. Joy*

**Biology 61.535** Special Studies in Physiology

A course dealing with some of the recent advances in physiology.

*Prerequisite:* Permission of the instructors.

*D. R. Gardner, S. L. Jacobson and J. Sinclair*

**Biology 61.540** Experimental Embryology

A lecture and laboratory course dealing with the theory and techniques involved in the elucidation of the interactions which occur during vertebrate development.

*Prerequisites:* Biology 61.350 and 61.455, and consent of the instructor.

*T. W. Betz*

## **Biology**

### **Biology 61.542 Endocrinology**

An experimental analysis of basic endocrinology, neuroendocrinology and modes of hormone action in vertebrates.

*Prerequisites:* Biology 61.340, and permission of the instructor.

*T. W. Betz*

### **Biology 61.545 Insect Physiology**

A course devoted to an advanced study of insect physiology.

*Prerequisites:* Biology 61.340 and 61.460.

### **Biology 61.550, 61.551, 61.552 Selected Topics**

To meet special needs of students, courses in advanced aspects of specialized biological subjects not covered by other graduate courses may be offered.

*Prerequisite:* Permission of the Department.

*Members of the Department*

### **Biology 61.555 Advanced Insect Morphology**

A course devoted to an advanced study of insect morphology and phylogeny.

*Prerequisite:* Biology 61.460.

*H. H. J. Nesbitt*

### **Biology 61.556 Advanced Insect Taxonomy**

A course devoted to an advanced study of insect taxonomy.

*Prerequisite:* Biology 61.460.

*H. F. Howden and H. H. J. Nesbitt*

### **Biology 61.557 Acarology**

An advanced course devoted to the Acari (mites).

*Prerequisite:* Biology 61.460.

*H. H. J. Nesbitt*

### **Biology 61.560 Plant Ecology**

*Prerequisite:* Permission of the instructors.

*Isabel Bayly and J. D. H. Lambert*

### **Biology 61.565 Animal Ecology**

*Prerequisite:* Permission of the instructors.

*H. G. Merriam and D. A. Smith*

### **Biology 61.566 Insect Ecology**

A course dealing primarily with problems and techniques in the analysis of insect population dynamics.

*Prerequisites:* Biology 61.340, 61.360 and Mathematics 69.250 or equivalent.

*C. A. Barlow*

### **Biology 61.570 Evolution and Biogeography**

*Prerequisite:* Permission of the instructor.

*H. F. Howden*

**Biology 61.575 Mammalogy**

A seminar and laboratory course on the taxonomy, distribution, and ecology of mammals.

*Prerequisites:* Biology 61.360 and 61.415.

*D. A. Smith*

**Biology 61.580 Plant Taxonomy**

*Prerequisite:* Biology 61.440.

*Isabel Bayly*

**Biology 61.585 Mycology**

An advanced course devoted to the morphology, reproduction, taxonomy, and evolution of the fungi.

*Prerequisite:* Biology 61.400.

*W. I. Illman*

**Biology 61.590 Directed Special Studies and Seminar**

*Prerequisite:* Permission of the Department.

*Members of the Department*

**Biology 61.599 Master's Research and Thesis**

**Biology 61.699 Doctoral Research and Thesis**



# Chemistry

Professor; Chairman of the

Department 1969-70

Professors

C. H. Amberg

R. G. Barradas, J. M. Holmes (on leave of absence, 1969-70), P. M. Laughton, J. M. Morton, D. R. Wiles (on leave of absence, 1969-70)

Associate Professors

J. W. ApSimon, C. L. Chakrabarti, J. A. Koningstein, P. Kruus (on leave of absence, 1969-70), C. H. Langford, M. Parris, R. H. Wightman

Assistant Professors

R. A. Shigeishi, C. S. Tsai, D. C. Wigfield

Lecturer

Mary I. Wilkinson

Visiting Professors

R. A. Beebe, M. C. Giordano, J. A. Young

Sessional Lecturers

Maryanne Hazenberg, Marcus Hotz, Robert Lao, Virginia Prince

Senior Demonstrators

June Byrne, R. T. Elworthy, Jacqueline Guthrie, Annie Kruus, Marion Moen, R. J. Talbot

Postdoctoral Fellows

John Hooper, Serge Joris, S. Khorana, H. G. Tsiang, V. S. Sastri, E. E. Sharkawi, S. C. Subbarao

Teaching Fellows

A. W. Ashbrook, D. M. R. Dixit, E. W. Hermann, T. N. Ng, John Sedlak, T. L. Slager, S. C. Srinivasan

## General

Students intending to major in Chemistry should have a strong background and interest in Mathematics and Physics. The programs of study can be varied somewhat from those outlined below depending on the interest of the student. However, the following outline represents the basic core of the Chemistry program and any deviation from this must be done in consultation with the Department.

## Major Program (minor in Mathematics and Physics)

### *Year I*

Chem. 65.100

Physics 75.100

Math. 69.100

Biol. 61.100 *or*

Geol. 67.100

Arts Elective

### *Year II*

Chem. 65.210

Chem. 65.220 *or* 65.250

A second year Math.

Physics 75.230

Language

### *Year III*

Chem. 65.250 *or* 65.220

*one of* Chem. 65.310, 65.320 *or* 65.350

An additional Math.

Science Option

Social Science

Biology or Geology minors would omit the additional Mathematics course in Year III, defer Physics 75.230 to Year III, and choose Biology or Geology courses in Years II and III in consultation with the Department of Chemistry.

It is recommended that candidates choose as one of their Arts electives a course in French, German, or Russian.

## Honours Program (minor in Mathematics and/or Physics)

*Year I*—as in Major Program

### *Year II*

Chem. 65.210

65.220

65.250

Physics 75.230

Math. Course

### *Year III*

*two of* Chem. 65.310,

65.320 *or* 65.350

an additional Math.

Science Option

Social Science *or*

Language

### *Year IV*

remaining 300 Chem. course

at least two of 400 Chem.

half courses

Chem. 65.498

Science Option

Arts course Option



## Chemistry

Normally a minor requires four courses. For Biology or Geology minors substitutions as in the Major Program are recommended. Each candidate for Honours is required to demonstrate a reading knowledge of one of scientific French, German, or Russian. Fourth year honours students are expected to attend departmental seminars and colloquia in their specialty.

### Honours Project

Each candidate for Honours in Chemistry is required as part of Chemistry 65.498 in the final year to carry out a substantial project and to write a report to his supervisor. The report and its defence are heavily weighted in determining the class of honours awarded. The report should be in the departmental office in typewritten form not later than April 15.

### Graduate Studies

Graduate studies at the M.Sc. and Ph.D. levels are offered in the Department in the major fields of Chemistry. Normally graduate work in Chemistry must be conducted full-time in residence, and research work must be done in the Department's laboratories under the supervision of the full-time faculty. Candidates for the M.Sc. and Ph.D. degrees are required to present and defend a thesis and demonstrate a reading knowledge of two of scientific French, German, or Russian.

All Ph.D. candidates must pass either oral or written comprehensive examinations at least one year prior to submission of the thesis.

Frequent seminars will be presented on research and other topics. Graduate students are expected to attend departmental seminars, and colloquia in their specialty.

### Chemistry 65.010 Introductory Chemistry

An introductory course emphasizing the fundamental laws and principles of chemistry. The laboratory course is designed to teach fundamental techniques and to give familiarity with some physical and chemical properties of a selected group of substances.

*Text:* To be announced.

*Day Division:* Annually (lectures three hours a week, laboratory three hours a week).

*I. M. Wilkinson*

### Chemistry 65.100 General Chemistry

Gases, liquids, solids, and solutions, chemistry of selected groups of elements and their compounds, including both inorganic and organic compounds; and a qualitative survey of the most important theories used to explain this behaviour: energy relationships, electron structure and the periodic table, quantization of energy, theories of chemical bonding and of chemical reaction. The laboratory course will give training in fundamental techniques and methods of experimental work in analysis, synthesis and other aspects of chemistry.

*Text:* To be announced.

*Prerequisites:* Chemistry 65.010 and Mathematics 69.010, or equivalents. This course is intended for students in all programs other than engineering who plan to take further chemistry courses.

*Day Division:* Annually (lectures three hours a week, laboratory three hours a week).

*J. A. Young*

**Chemistry 65.105** General Chemistry

Lecture and laboratory outline the same as Chemistry 65.100 above.

*Text:* Keenan and Wood, *General College Chemistry* (Third Edition).

*Problem book:* Sien Ko, *Chemistry Problems*.

*Prerequisites:* Chemistry 65.010 and Mathematics 69.010 or equivalent. For Engineering students only.

*Day Division:* Annually (lectures three hours a week, laboratory three hours a week).

*J. M. Morton*

**Chemistry 65.106** General Chemistry

Selected fundamental concepts of chemistry will be treated in depth to emphasize the subject as an important part of the physical sciences. The course will combine principles with contemporary relevant aspects of chemistry. This course may not be used to meet requirements 3-5 p. 52 in first-year science nor to meet prerequisites for further study of chemistry. It will assume prior experience in chemistry to at least the Grade 12 level.

*Day Division:* Annually (lectures three hours a week).

*R. G. Barradas*

**Chemistry 65.210** Introductory Physical Chemistry

The theory of ideal and real gases, liquids, and solutions; phase equilibria; chemical reaction equilibria; chemical kinetics; electrochemistry; surface chemistry; macromolecules. Thermodynamic concepts will be strongly emphasized.

*Texts:* Moore, *Physical Chemistry*.

Daniels, Mathews and Williams, *Experimental Physical Chemistry*.

*Prerequisites:* Chemistry 65.100 and Mathematics 69.100 or 69.101.

*Day Division:* Annually (lectures three hours a week, problems one hour a week, laboratory three hours a week).

*C. H. Amberg*

**Chemistry 65.220** Elementary Organic Chemistry

Structure, synthesis and reactions of the main functional groups with emphasis on aliphatic and simple aromatic systems. An introduction to bonding and mechanisms. The laboratory includes synthesis and characterization of the more important functions and an introduction to modern instrumentation.

*Texts:* Sykes, *A Guidebook to Mechanism in Organic Chemistry*.

Morrison and Boyd, *A Textbook of Organic Chemistry*.

*Prerequisite:* Chemistry 65.100.

*Day Division:* 1969-70 (lectures three hours a week, laboratory four hours a week).

*Evening Division:* Next offered, 1970-71.

*R. H. Wightman*

**Chemistry 65.222** Introductory Organic Chemistry

A course for non-chemistry majors. An introduction to organic chemistry paralleling Chemistry 65.220 but with an introduction to, and emphasis on, the chemistry of biologically important compounds.

*Text:* To be announced.

*Prerequisite:* Chemistry 65.100 or 65.105.

*Day Division:* Annually (lectures three hours a week, laboratory four hours a week).

*D. C. Wigfield*

## Chemistry

### Chemistry 65.250 Elementary Inorganic and Analytical Chemistry

The chemical principles underlying gravimetric, titrimetric, and instrumental analysis. Elements of bonding theory and descriptive chemistry of typical elements. Laboratory work in gravimetric, titrimetric, and instrumental analysis, and simple inorganic syntheses.

*Texts:* Bell and Lott, *A Modern Approach to Inorganic Chemistry*.

Skoog and West, *Fundamentals of Analytical Chemistry*.

*Prerequisites:* Chemistry 65.100 and Mathematics 69.100 or 69.101.

*Day and Evening Divisions:* 1969-70 (lectures three hours a week, laboratory four hours a week).

*C. L. Chakrabarti, A. W. Ashbrook*

### Chemistry 65.300\* Methods of Theoretical Chemistry

Methods of mathematical analysis of interest to chemists including the elements of computer science and its application to problems such as error analysis, matrix calculations, numerical integration, and numerical solutions of differential equations. *Text:* To be announced.

*Prerequisites:* Mathematics 69.201, or 69.205 and 69.245; Chemistry 65.210.

*Day Division:* Annually (lectures and problems three hours a week, first term).

*J. A. Koningstein*

### Chemistry 65.310 Physical Chemistry

An introduction to quantum mechanics, and its use in explaining atomic and molecular structure and spectra. Introduction to statistical mechanics and its application to simple systems. Theories of chemical kinetics with applications.

*Text:* To be announced.

*Prerequisites:* Chemistry 65.210, Mathematics 69.201 or 69.205\*-245\*.

*Day Division:* Annually (lectures three hours a week, problems and laboratory four hours a week).

*R. A. Shigeishi*

### Chemistry 65.320 Intermediate Organic Chemistry

Resonance and aromaticity, structure reactivity relationships and conformational analysis. Spectroscopy and its applications. Selected reactions with emphasis on mechanistic rationale and synthetic usefulness. Special topics, e.g. radicals, polymers, heterocycles. The laboratory work will consist of small scale preparations and project-type experiments emphasizing modern techniques.

*Text:* To be announced.

*Supplementary References:* Gould, *Mechanism and Structure in Organic Chemistry*; Williams and Fleming, *Spectroscopic Methods in Organic Chemistry*.

*Prerequisite:* Chemistry 65.220 or 65.222.

*Day Division:* Annually (lectures three hours a week, laboratory four hours a week).

*J. W. ApSimon*

### Chemistry 65.350 Intermediate Inorganic Chemistry

Chemistry of the transition metals. Introduction to coordination compounds: structures, stabilities and reaction mechanisms. Ionic, metallic, and non-stoichiometric compounds. Introduction to radioactivity and its chemical applications. Laboratory work: the synthesis and study of some inorganic compounds and the use of radioactive tracers.

*Texts:* Douglas and McDaniel, *Concepts and Models of Inorganic Chemistry*.

D. M. Adams and J. B. Raynor, *Advanced Practical Inorganic Chemistry*.

*Prerequisites:* Chemistry 65.210 and 65.250.

*Day Division:* Annually (lectures three hours a week, laboratory four hours a week).

*M. Parris*

## Honours Courses

### Chemistry 65.410\* Introduction to Quantum Chemistry

Theory of wave function and energy levels of simple and more complicated atoms. Introduction to molecular-orbital theory and group theory.

*Prerequisite:* Chemistry 65.310 or permission of the instructor.

*Day Division:* Annually (lectures and seminars three hours a week, first term).

*J. A. Koningsstein*

### Chemistry 65.411\* Statistical Thermodynamics

An introduction to quantum and classical statistical thermodynamics with applications to the theories of solids, liquids, and gases.

*Prerequisite:* Chemistry 65.310 or permission of the instructor.

*Day Division:* Annually (lectures and seminars three hours a week, first term).

*Lecturer to be announced*

### Chemistry 65.412\* Chemical Kinetics

Theories of rates of chemical reaction with application to elementary gas and solution reactions. Complex reactions in gases, solutions and on surfaces.

*Prerequisite:* Chemistry 65.310 or permission of the instructor.

*Day Division:* Annually (lectures and seminars three hours a week, second term).

*Lecturer to be announced*

### Chemistry 65.413\* Colloid and Surface Chemistry

Properties and stability of colloidal systems, theories of adsorption, heterogeneous catalysis, and interfacial phenomena.

*Prerequisite:* Chemistry 65.310 or permission of the instructor.

*Day Division:* Annually (lectures and seminars three hours a week, second term).

*Lecturer to be announced*

### Chemistry 65.420\* Physical Organic Chemistry

Theories of structure; correlations of structure, properties, and reactivity; methods for determining reaction mechanisms.

*Prerequisites:* Chemistry 65.320 and permission of the instructor.

*Day Division:* Annually (lectures and seminars three hours a week, first term).

*P. M. Laughton*

### Chemistry 65.422\* Natural Products

Structure proof, synthesis and biogenesis of the major classes of natural products with emphasis on the more modern aspects of the field.

*Prerequisites:* Chemistry 65.320 and permission of the instructor.

*Day Division:* Annually (lectures and seminars three hours a week, first term).

*J. W. ApSimon*

## Chemistry

### **Chemistry 65.423\*** Organic Stereochemistry

A study of both the static and the dynamic aspects of modern stereochemical theory.

*Prerequisites:* Chemistry 65.320 or permission of the instructor.

*Day Division:* Annually (lectures and seminars three hours a week, second term).

*P. M. Laughton*

### **Chemistry 65.430\*** Electrochemistry

Theory of ionic solutions, electrode processes and some aspects of electro-analytical chemistry.

*Prerequisites:* Chemistry 65.210 and 65.250 and permission of the instructor.

*Day Division:* Annually (lectures and seminars three hours a week, first term).

*R. G. Barradas*

### **Chemistry 65.431\*** Instrumental Methods in Chemistry

Selected topics from: Atomic and molecular absorption spectroscopy. Emission spectroscopy. X-ray methods. Mass spectrometry. Differential migration methods — solvent extraction, ion exchange, chromatography.

*Reference Texts:* Dodd, *Chemical Spectroscopy*, Meites and Thomas, *Advanced Analytical Chemistry*; Laitinen, *Chemical Analysis*; Willard, Merritt, and Dean, *Instrumental Methods of Analysis*.

*Prerequisites:* Chemistry 65.210 and 65.250 and permission of the instructor.

*Day Division:* Annually (lectures and seminars three hours a week, second term).

*C. L. Chakrabarti*

### **Chemistry 65.440\*** Biochemistry

Chemistry of biological compounds. Their biological importance and physico-chemical approaches to the study of these compounds. The laboratory includes a special project of biochemical interest.

*Prerequisites:* Chemistry 65.210 and 65.220 and permission of the instructor.

*Day Division:* Annually (lectures and seminars three hours a week, first term).

*C. S. Tsai*

### **Chemistry 65.441\*** Biochemical Energetics

An introduction to enzyme chemistry and bioenergetics. Metabolism of biological compounds and their regulation, biosynthesis of biopolymers and their control. The laboratory includes a special project of biochemical interest.

*Prerequisites:* Chemistry 65.440\* or Biology 61.350, and permission of the instructor.

*Day Division:* Annually (lectures three hours a week, second term).

*C. S. Tsai*

### **Chemistry 65.450\*** Applications of Ligand Field Theory

Introduction to quantitative crystal field theory. The weak field approximation and application to heats of ligation. The strong field approximation and application to spectra and magnetism.

*Prerequisites:* Chemistry 65.310 and 65.350.

*Day Division:* Annually (lectures three hours a week, first term).

*M. Parris*

### **Chemistry 65.452\*** Radiochemistry

A study of nuclear stability and decay; chemical studies of nuclear phenomena. Selected laboratory experiments are optional.

*Reference Text:* Friedlander, Kennedy, and Miller, *Nuclear and Radiochemistry*.

*Prerequisite:* Chemistry 65.350.

*Day Division:* Annually (lectures and seminars three hours a week, second term).

*Lecturer to be announced*



**Chemistry 65.498** Research Project and Seminar

Senior students in Honours Chemistry will carry out a research project under the direction of one of the members of the Department.

*Day Division: Annually.*

**Graduate Courses**

Graduate half courses will be offered on a rotating basis by years and terms in collaboration with the University of Ottawa. Co-operative programs have been worked out in certain areas and details will be available at registration.

**Chemistry 65.510** Quantum Chemistry

*J. A. Koningstein*

**Chemistry 65.511** Structure and Dynamics in Liquids

*Lecturer to be announced*

**Chemistry 65.512** Chemical Kinetics

*Lecturer to be announced*

**Chemistry 65.513** Surface Chemistry and Catalysis

*C. H. Amberg and R. A. Shigeishi*

**Chemistry 65.520** Physical Organic Chemistry

*P. M. Laughton*

**Chemistry 65.522** Natural Products Chemistry

*J. W. ApSimon, D. C. Wigfield*

**Chemistry 65.523** Synthetic Organic Chemistry

*R. H. Wightman*

**Chemistry 65.535\*** Electronic Spectroscopy-Absorption

First Term, 1969-70.

*C. L. Chakrabarti*

**Chemistry 65.536\*** Electronic Spectroscopy-Emission

Second Term, 1969-70.

*C. L. Chakrabarti*

**Chemistry 65.540** Biochemistry of Enzyme Action

*C. S. Tsai*

**Chemistry 65.550\*** Theory of Transition Metal Ions I

First Term, 1970-71.

*Lecturer to be announced*

**Chemistry 65.551 \*** Theory of Transition Metal Ions II

First Term, 1969-70.

*Lecturer to be announced*

**Chemistry 65.552\*** Radiochemistry

Second Term, 1969-70.

*Lecturer to be announced*



## **Chemistry**

### **Chemistry 65.553\*** Chemical Effects of Nuclear Transformations

Second Term, 1970-71.

*D. R. Wiles*

### **Chemistry 65.554\*** Reaction of (coordinated) Ligands

Second Term, 1969-70.

*M. Parris*

### **Chemistry 65.555\*** Metal Ions in Solution

Second Term, 1970-71.

*C. H. Langford*

### **Chemistry 65.556\*** Non-Metal Chemistry

First Term, 1969-70.

*Lecturer to be announced*

### **Chemistry 65.557\*** Non-Aqueous Solvents

First Term, 1970-71.

*Lecturer to be announced*

### **Chemistry 65.590** Directed Special Studies

*Members of the Department*

### **Chemistry 65.599** Master's Research and Thesis

*Members of the Department*

### **Chemistry 65.699** Doctoral Research and Thesis

*Members of the Department*

# Classics

Professor; Chairman  
of the Department  
Professor  
Assistant Professors

A. Trevor Hodge  
F. Ellenor M. Swallow  
D. G. Beer, A. S. Fotiou, R. Jeffreys (St. Patrick's  
College, on leave of absence, 1969-70), T. R. Robinson,  
M. E. Welsh (St. Patrick's College)  
R. C. Blockley (on leave of absence, 1969-70),  
J. Trainor (St. Patrick's College)

Lecturers

Qualified students may read for Honours in Classics, or students may elect Latin, or Greek, or a combination of the two as their major field of study in a Pass course; or students who are reading for honours in another discipline may elect either Latin or Greek as a minor field of interest.

Combined Major work or Honours work in either Greek or Latin and another discipline may be arranged upon consultation with the departmental chairmen concerned.

## Major in Classics

Major in Latin: 5 Latin courses to be chosen in consultation with the department; Classics 14.490; Classical Civilization 13.291.

Major in Greek: 5 Greek courses to be chosen in consultation with the department; Classics 14.490; Classical Civilization 13.290.

### Major in Classics:

Emphasis on Latin: 4 Latin and 3 Greek courses to be chosen in consultation with the department; Classics 14.490.

Emphasis on Greek: 4 Greek and 3 Latin courses to be chosen in consultation with the department; Classics 14.490.

*Note:* A general examination, either written or oral, will be given to all students in the final year of a "major" program, in addition to the regular course examinations.

## Honours Course

### First year Arts

It is recommended that a student take both Greek and Latin from the beginning of his university course, thus simplifying the arrangement of his subsequent program. Second, Third and Fourth years:

#### Emphasis on Latin:

5 further courses in Latin.

Classical Civilization 13.291 (Roman history), or 13.309 (Greek and Latin literary forms), or 13.320 (Social and economic history), or 13.429 (Greek and Roman history).

Classics 14.490 (Seminar).

3 further courses in Greek.

4 options.

#### Emphasis on Greek:

5 further courses in Greek.

Classical Civilization 13.290 (Greek History), or 13.309 (Greek and Latin literary forms), or 13.320 (Social and economic history), or 13.429 (Greek and Roman history).

Classics 14.490 (Seminar).

3 further courses in Latin.

4 options.

## Classics

A student may instead elect to take five courses each of Latin and Greek (over the four years); and either Classical Civilization 13.290 or 13.291 or 13.309 or 13.320 or 13.429; Classics 14.490 (Seminar); 4 options.

Total: Twenty courses in four years, of which at least twelve must be classical.

*Note:* At the end of an honours course, students will be required to take a comprehensive examination, either written or oral, to test their general knowledge in the field of Classics. Although no specific grade will be assigned here, a student will not be recommended for the degree unless he has passed this examination satisfactorily. Also, it will be taken into consideration, along with all work done in the Classics department, in the awarding of first, high second, second, or third class honours.

## Graduate Studies

A program of studies leading towards a master's degree in Classics is available. For general regulations see p. 67. Within the department the degree may be sought in one of three categories: Classics, or Greek only, or Latin only.

Departmental prerequisites for all students:

1. Some knowledge of German must be proved. German 22.015 or its equivalent will be accepted for this purpose; or the satisfactory passing of a reading test in German may be acceptable.
2. Students intending to take the degree in one classical language only must have at least an elementary knowledge of the other; thus, for an M.A. in Greek only a student must have at least Latin 16.010 or its equivalent; for an M.A. in Latin only he must have at least Greek 15.015 or its equivalent.

These prerequisites should normally be fulfilled before the writing of the thesis is undertaken.

Students entering the M.A. program who already have an honours degree will normally need to take three five-hundred-level courses and write a thesis which will be considered the equivalent of two further courses. But the prerequisites stated above should be noted.

Students entering from a pass B.A. will normally be required to take eight courses (at least three of which shall be at the five-hundred-level) and to write a thesis which will be considered the equivalent of two further courses. The usual five courses of the qualifying graduate year will be chosen to complement and complete the classical program of the undergraduate degree, and will include at least two literature courses either at graduate or honours level.

In both categories the three courses in the M.A. year proper will be selected in accordance with the students' particular needs. The Department does not offer the degree by course work alone.

Offerings for 1969-70 are as follows:

### **Greek 15.015** Introduction to Language and Reading

A beginning course to introduce students not only to grammar and syntax, but also to the reading of continuous prose.

*Day Division:* 1969-70 (lectures and practice periods four hours a week).

*D. G. Beer*

*Summer:* 1969 *Evening Division* (lectures five hours a week).

*R. Jeffreys*

**Greek 15.100 Literature and Reading**

Study of the forms and development of Greek literature. Reading in one prose author and one poet. Some time will also be devoted to prose composition.

*Prerequisite:* Greek 15.015 or the equivalent.

*Day Division:* 1969-70 (lectures three hours a week).

*A. T. Hodge*

**Greek 15.150 Composition and Sight Translation**

*Not offered, 1969-70.*

**Greek 15.240 The Orators**

*Not offered, 1969-70.*

**Greek 15.260 Philosophy**

*Not offered, 1969-70.*

**Greek 15.280 The Tragedians**

*Not offered, 1969-70.*

**Greek 15.300 History**

Herodotus and Thucydides

*Prerequisite:* A Greek course at the 100 level, or permission of the Department.

*Day Division:* 1969-70 (two tutorial hours a week).

*T. R. Robinson*

**Greek 15.320 Homer**

*Not offered, 1969-70.*

**Greek 15.410 Comedy**

Aristophanes, Menander; and the history of comedy.

*Prerequisite:* A Greek course at the 100 level, or permission of the Department.

*Day Division:* 1969-70 (two tutorial hours a week).

*A. S. Fotiou*

**Greek 15.420 The Lyric Poets**

*Not offered, 1969-70.*

**Latin 16.100 Reading**

Selections from various authors throughout the classical period. The course is primarily intended for students who would like another year of Latin beyond senior matriculation, but do not expect to continue thereafter. From 1970-71 it will not normally admit a student to further Latin courses, without permission of the department, probably based upon a further examination, oral or written.

*Prerequisite:* Latin 16.010 or the equivalent. (From 1970-71 St. Patrick's Latin 05.020 or Ontario senior matriculation Latin or the equivalent).

*Day Division:* 1969-70 (lectures three hours a week).

*Summer:* 1969 *Day Division* (lectures ten hours a week).

*W. J. Watts*

## Classics

### **Latin 16.110** Literature

A Latin course intended primarily for prospective majors and honours students in the department. As in 16.100, readings will be from various authors in the classical period, but there will also be more time given to study and discussion of the authors themselves and their literary milieu.

*Prerequisite:* Latin 16.010 or the equivalent. (From 1970-71 St. Patrick's Latin 05.020 or Ontario Senior Matriculation Latin or the equivalent).

*Day Division:* 1969-70 (lectures three hours a week).

### **Latin 16.150** Composition and Sight Translation

*Not offered, 1969-70.*

### **Latin 16.260** The Historians

*Not offered, 1969-70.*

### **Latin 16.280** Virgil

Reading of Virgil, and a study of classical epic poetry.

*Prerequisite:* A Latin course at the 100 level, or permission of the Department. (From 1970-71 Latin 16.110 or permission).

*Day Division:* 1969-70 (two tutorial hours a week).

### **Latin 16.340** Lyric and Elegy

*Not offered, 1969-70.*

### **Latin 16.360** The Letter-writers

*Not offered, 1969-70.*

### **Latin 16.380** Comedy and Satire

*Not offered, 1969-70.*

### **Latin 16.410** Oratory

Theory and practice of the Roman orators.

*Prerequisite:* A Latin course at the 100 level, or permission of the Department. (From 1970-71 Latin 16.110 or permission).

*Day Division:* 1969-70 (two tutorial hours a week).

*M. E. Welsh*

### **Latin 16.420** Philosophy

*Not offered, 1969-70.*

## Seminar

### **Classics 14.490** Special Problems

Required of students taking their major work, or reading for Honours, in Classics.

*Prerequisite:* Permission of the Department.

*Day Division:* 1969-70 (two tutorial hours a week).

*A. T. Hodge*

### **Classical Civilization 13.205** Some Aspects of Greek and Roman Civilization

An introduction to classical Greek and Roman antiquity which will discuss selected political, cultural and historical topics. It is especially recommended for students from other faculties who desire an Arts option, or for Arts students whose interest is general rather than specifically historical. There will be appropriate readings from classical authors in English translation.

*Evening Division:* 1969-70 (lectures two hours a week).

*J. Trainor*

**Classical Civilization 13.290** Greece in the Ancient World

The history and civilization of classical Greece with special attention to the development of her characteristic institutions. (This course is also listed as History 13.290). It is particularly intended for majors and honours students in Classics and in History, or for such other students as may wish to explore in some depth and detail the historical development of classical Greece.

*Evening Division:* 1969-70 (lectures two hours a week).

*A. S. Fotiou*

**Classical Civilization 13.291** Rome in the Ancient World

The history of ancient Rome, her growth and expansion, and her organization during the Republic and the early Empire. (This course is also listed as History 13.291). It is particularly intended for majors and honours students in Classics and in History, or for such other students as may wish to explore in some depth and detail the historical development of classical Rome.

*Day Division:* 1969-70 (lectures two hours a week).

*T. R. Robinson*

**Classical Civilization 13.309** Greek and Latin Literary Genres

A study through English translations of the various *genres* of Greek and Latin literature, especially those which influenced later European writing: epic, drama, the ode, pastoral poetry, satire. (This course is also listed as English 13.309).

*Day Division:* 1969-70 (lectures two hours a week).

*D. G. Beer*

**Classical Civilization 13.310** Greek Literature in Translation

The development of Greek literature and literary forms from Homer to the Hellenistic period, with extensive reading of Greek authors in English translation.

*Not offered, 1969-70.*

**Classical Civilization 13.311** Latin Literature in Translation

The development of Latin literature and literary forms from the earliest times to the early Empire, with extensive reading of Latin authors in English translation.

*Not offered, 1969-70.*

**Classical Civilization 13.320** A Social and Economic Survey of the Ancient World

A study of ancient religion, politics, law, trade, slavery, and other institutions characteristic of Greek and Roman society.

*Evening Division:* 1969-70 (lectures two hours a week). This course will be alternated with Classical Civilization 13.330.

*A. T. Hodge*

**Classical Civilization 13.330** Classical Art and Archaeology

A study of the material remains of the ancient world from Minoan Crete and early Greece to the Roman Empire, with special attention to pottery, sculpture, painting, and architecture.

*Not offered, 1969-70.* This course will be alternated with Classical Civilization 13.320.

**Classical Civilization 13.429** Selected problems in Greek and Roman History

This course is also listed as History 13.429, and is given for honours students in History and in Classics. Some knowledge of Latin at least (if not Greek) is highly desirable.

*Prerequisite:* Permission of the department.



## Classics

### Graduate Courses

The following graduate courses are available as required.

**Classics 14.501** Mediaeval Latin

**Classics 14.505\*** Introduction to linguistics (half course)

**Classics 14.506\*** Elementary text criticism (half course)

**Classics 14.510 (Greek) and 14.511 (Latin)** Advanced composition

**Classics 14.520 (Greek) and 14.521 (Latin)** An author in depth

**Classics 14.530 (Greek) and 14.531 (Latin)** A literary period or genre, in depth

**Classics 14.540 (Greek) and 14.541 (Latin)** The literary critics and theorists

**Classics 14.599** Thesis (for the M.A.—two-course equivalent)

Of these, in 1969-70 the following will be offered:

**Classics 14.520 or 14.521** An author in depth

*A. S. Fotiou*

**Classics 14.530 or 14.531** A genre in depth

*D. G. Beer*

**Classics 14.540 or 14.541** The literary critics and theorists

*Ellenor Swallow*

# Economics

Professors	T. N. Brewis, H. E. English, S. May
Associate Professor; Chairman of the Department	G. Paquet
Associate Professors	R. L. Carson, R. Caterina (Accounting), G. E. Clarke, (St. Patrick's College), W. I. Gillespie, K. A. J. Hay, N. H. Lithwick (on leave of absence, 1969-70), A. J. Little, (St. Patrick's College), Kanta Marwah, T. K. Rymes (on leave of absence, 1969-70), W. R. Scott (Accounting), J. B. Waugh (Accounting) (on leave of absence, 1969-70)
Assistant Professors	M. D. Bordo, E. U. Choudhri, J. C. Danielsen, C. L. Johnson, Leon N. Ledohowski (Accounting), C. McMillan, Jr., Soo Bin Park (St. Patrick's College), G. Rich, A. R. Ritter (Joint Appointment: School of International Affairs), R. F. Sullivan, R. D. Vanderberg
Sessional Lecturers	P. J. Faulkner (Accounting), N. G. Ross (Accounting), W. F. Ryan, S.J., G. P. Wilson (Accounting)

## The Economics courses are divided into six categories

1. Economics 43.100—to be taken in First year.
2. Basic courses in theory, economic history and statistics. Economics 43.200, 43.210, and 43.220—appropriately taken in Second year and one of Economics 43.305, 43.315, 01.315, 43.325 or 01.325 — appropriately taken in third year.
3. Second or Third year options—courses numbered 43.326—43.399.
4. Senior options—courses numbered 43.400—43.485—normally taken in Third or Fourth year (also see Graduate Studies).
5. Special honours courses—courses numbered 43.486—43.499—for honours students only.
6. Graduate seminars and thesis—courses numbered 500 and higher.

## Major Courses

Students seeking admission to the major or honours programs in Economics will normally be expected to have credits in Grade 13 Mathematics (both papers) or the equivalent. Mathematics 69.101 is a requirement in the First year.

A student will normally be permitted to major in Economics only if he or she obtained a C— grade in Economics 43.100.

Students who major in Economics will take at least six Economics courses—categories 1 and 2 and at least one course from category 4. One of the category 2 courses may be postponed to Third year. The student's program for the Second and Third years must be approved by the Chairman of the Department of Economics.

## Honours Courses

Honours courses may be entered from the Honours first year in the Social Sciences (see p. 27), or by transfer from the major course if University regulations for entry (see p. 13) have been met. The student's program for the second and subsequent years will be planned in consultation with the Chairman of the Department. The student will also be assigned an individual faculty adviser.

The honours requirements include the required courses in categories 1 and 2, and at least two from category 4. In his final year the student will also fulfil two requirements

## Economics

qualitatively different from the others: the Tutorial in Modern Classics (43.490) and the Honours Essay (43.498). A grade of at least B— will be required in the honours essay. Honours students, including combined honours students, will take a comprehensive examination (written and oral) at the end of the final year.

For purposes of determining an honours student's standing at graduation, all Economics courses, except Economics 43.100, will be considered. The comprehensive examination will be given a weight of 1.

### *Combined Honours in Economics and Political Science*

Students intending to take this course should take Economics 43.100 or Political Science 47.100 (or preferably both) in the First year. The choice of courses in subsequent years will be subject to the approval of the chairmen of the two departments. The honours requirements include at least six courses in Economics and six courses in Political Science, one of which must be Political Science 47.498 or Economics 43.498, to be taken in the student's final year. These will be arranged so that the student may transfer either to full honours in Political Science or to full honours in Economics at the end of the Third year, if he then wishes to specialize more intensively. Students must also meet the language requirements of the Department of Political Science.

### *Combined Honours in Economics and Mathematics*

Students intending to take this course will take seven courses in Economics and eight in Mathematics and meet the two departments' requirements for comprehensive examinations. Each year's program should be determined in consultation with the two departments.

The Economics courses taken shall be: Economics 43.100, 43.200, 43.210, 43.305 or 43.315 or 43.325 or another economics course with permission of the Department, 43.490<sup>(1)</sup>, 43.498 and one other 400 level course.

The Mathematics courses taken in the first two years shall be: Mathematics 69.100, 70.200, 70.210, 70.257\*, and 70.245\*; those of the final two years shall be: Mathematics 70.300, 70.350, and two more courses at the 300 or 400 level (one must be at the 400 level).

*Consideration will also be given to applications for Combined Honours in Economics and History, and Economics and Sociology.*

## Graduate Studies

The Department of Economics offers studies leading to the degree of Master of Arts in both day and evening divisions.

### *Admission Requirements*

Students normally enter the First year of this program if they have a Carleton University Honours B.A. degree in Economics or its equivalent in both content and standing. Applicants are expected to have had an adequate preparation in mathematics and statistics, to the extent of having passed courses comparable to Mathematics 69.100 or 69.101 (linear algebra, differential and integral calculus) and Economics 43.220 (probability theory, statistical analysis, correlation and regression analysis), as listed in the Carleton University calendar. If students have deficiencies in these or any other respects, they must be made up to the satisfaction of the Department during the first year of enrolment.

Students with pass degrees, honours degrees in disciplines other than economics, or major deficiencies in their undergraduate training will normally be expected to

<sup>(1)</sup>43.490 or, with permission of the Department and the instructor, 43.575.

enter a Qualifying M.A. year, prior to admission to the first year of full graduate study.

### *Course Requirements*

There are two avenues leading to the M.A. degree:

#### (a) Degree by course work:

Students are required to pass *five* courses in the first year of graduate studies. These courses must include Economics 43.500, 43.510\*, and 43.520, plus two other 500-level offerings.

#### (b) Degree through course work and thesis:

Students are required to pass Economics 43.500, 43.510\*, and 43.520. A thesis<sup>(1)</sup> equivalent to two courses must be written. Thesis topics must be chosen in fields in which a member of the Department is prepared to supervise the work.

### *Residence Requirements*

Candidates for the M.A. degree are accepted on both part-time and full-time bases. Part-time students can only proceed to the degree through a program of course work and thesis preparation (see (b) above), and they must be prepared to take their courses in the daytime if necessary. Full-time students must spend one year in residence.

### *Graduation Requirements*

The Department requires that candidates for the M.A. degree achieve a grade of B— or better in each course, comprehensive examination, and thesis (where relevant) as a prerequisite for graduation. Candidates taking the five course M.A. program and who wish to proceed to the Ph.D. may postpone taking their comprehensives until the end of the first year of their Ph.D. program.

The Department of Economics intends to offer studies leading to the degree of Doctor of Philosophy, commencing in the Fall of 1969 in the day division.

### *Admission Requirements*

Students are admitted to the Ph.D. program providing they have completed their first full year of graduate study at the University with no less than a grade of B in each course. Admission to the program is also open to those who have an M.A. or equivalent degree in economics, with standings no less than B, from another accredited university.

### *Course Requirements*

Second year graduate students are required to take Economics 43.600, 43.610\*, and 43.620, plus two and one-half other courses from among the Departments 600 and 500-level offerings to be decided upon in consultation with the Chairman of Graduate Studies in Economics.

### *Thesis Requirements*

Third year graduate students will undertake a Doctoral dissertation equivalent to five course credits.

### *Residence Requirements*

Ph.D. students will normally spend three years in full-time residence, unless they are exempted one year by virtue of an appropriate Master's degree or equivalent. The

<sup>(1)</sup>A candidate in the final M.A. year is asked to note that if he wishes to receive his degree at the Spring Convocation following his registration in the previous Fall, four copies (see pp. 67-69) of his thesis must be submitted to the Department at least eight weeks prior to Convocation.

## Economics

third year may, by special permission, be spent at another university or approved institution.

### *Graduation Requirements*

Candidacy for the degree of Doctor of Philosophy will be offered only to those students who have completed their two year course requirements (one year beyond M.A., or equivalent) plus comprehensive examinations with no less than B in all final standings. The Doctoral degree will be awarded to a candidate upon completion and oral defence of the dissertation.

### *General Admission Requirements*

Applicants whose mother tongue is not English will normally be required to write the University of Michigan English Language Test. At the discretion of the Department, certain applicants will be required to write the Graduate Record Examinations Aptitude Test and the advanced test in Economics offered by the Educational Testing Service.

### **Economics 43.010** Economics and Society

An introduction for Colombo Plan students to the concepts and ideas of political economy. Other students from overseas may be admitted with the permission of the instructor.

*Day Division:* 1969-70 (lectures and discussion groups three hours a week).

### **Economics 43.100** Principles of Economics

An introduction to the concept of economic welfare and its relation to society's other economic goals, e.g., the efficient use and allocation of resources, an appropriate rate of growth of production, and stability in output, employment and prices. The basic principles and statistical measures used in examining these goals and the means of achieving them are discussed. Public policies affecting the distribution of income, the control of monopoly, and the maintenance of stability in employment and prices are also discussed.

*Day Division:* Annually (lectures and classes four hours a week).

*Evening Division:* Annually (lectures and classes four hours a week).

*G. E. Clarke, W. I. Gillespie, and G. Rich*

*Summer Session:* 1969 *Evening Division* (lectures and classes six hours a week).

*G. E. Clarke*

### **Economics 43.200** Price Theory

The modern analysis of production and distribution with special reference to the determination of the conditions which maximize social welfare. The major courses of departure from the social welfare optimum in a full employment economy, with particular attention to imperfections in competition.

*Prerequisite:* Economics 43.100.

*Day Division:* Annually (lectures two hours a week).

*Evening Division:* Annually (lectures two hours a week).

*Summer Session:* 1969 *Evening Division* (lectures five hours a week).

### **Economics 43.210** Aggregate Economic Theory and Policy

An examination of modern macroeconomic theory, with special reference to domestic and international monetary theory. A survey of Canadian and international financial institutions and arrangements. A critical examination of macroeconomic problems and the policies advocated for their solution.



*Prerequisite:* Economics 43.100.

*Day Division:* Annually (lectures two hours a week).

*Evening Division:* Annually (lectures two hours a week).

*Summer Session:* 1969 *Evening Division* (lectures five hours a week).

### **Economics 43.220** Statistical Methods in the Social Sciences

An introduction to the principal statistical measurements. The use of statistical analysis as a method for the precise and reliable acquisition of knowledge in the social sciences will be stressed. The misuse of statistical information will be examined. (This course is listed also as Sociology 53.205). Economics 43.220 will yield a half credit only, if Mathematics 69.250 has been taken for credit and will yield no credit if Psychology 49.205 has been taken for credit. Credit for both Economics 43.220 and Mathematics 69.257 may be had only by permission of the departments.

*Prerequisites:* Mathematics 69.010 and one of Economics 43.100, Political Science 47.100, Sociology 53.100; or the permission of the instructor.

*Day Division:* Annually (lectures two hours a week, laboratory two hours a week).

*Evening Division:* Annually (lectures two hours a week, laboratory two hours a week).

### **Economics 01.300** Labour Economics

(Offered during 1969-70 only at the St. Patrick's campus).

### **Economics 43.305** Selected Topics in Economic History

Examination of the Economic Development of selected economies. The countries to be discussed will be outside Europe and North America, e.g; Argentina, Brazil, Japan, Australia and Africa, etc.

*Prerequisite:* Economics 43.100 or permission of the instructor.

*Day Division:* 1969-70 (lectures three hours a week).

### **Economics 43.315** European Economic History

An examination of the development of economic institutions, especially those aspects of history which may be used to explain the character of the principal economic institutions and practices of the present day. (This course is also listed as History 43.315).

*Prerequisite:* Economics 43.100, or the permission of the instructor.

*Day Division:* 1969-70 (lectures two hours a week).

### **Economics 43.321\*** National Accounting

An introduction to the modern social accounting framework encompassing the national product accounts, the input-output accounts, and national transactions accounts, with emphasis on Canadian practice. Attention will be paid to new developments such as national wealth accounts, constant dollar accounts, productivity measurement and an examination of the Social accounts for underdeveloped and socialist countries.

*Not offered, 1969-70.*

### **Economics 43.325** The Economic Development of Canada

An examination of the development of the Canadian economy with emphasis on the post-Confederation period. Attention will be focused on the changing patterns of internal and external factor and commodity flows, productivity, and technological change. Frequent comparisons with U.S. economic development will be made. (This course is also listed as History 43.325).

*Prerequisite:* Economics 43.100 or History 24.230 or 24.235.

*Evening Division:* 1969-70 (lectures three hours a week).



## Economics

### **Economics 01.330** Social Economics

An examination of some of the ways in which public authorities attempt to reshape the economic environment towards a greater conformity to social values. The objectives and practice of social security schemes, housing policy, "the war on poverty" etc. will be considered.

*Prerequisite:* Economics 43.100.

(This course is offered by the Department of Economics only at the St. Patrick's campus).

### **Economics 43.335** Political Economy in the Modern State

*Prerequisites:* Economics 43.100, Political Science 47.100, and a further course in either Economics or Political Science.

*Not offered, 1969-70.*

### **Economics 43.340** Problems of Area Development

A seminar on the location of economics activity and the problems of those areas lagging behind in economic development, with particular reference to the Canadian scene. Measures to improve the lot of these areas and the rationale of the underlying public policy.

*Prerequisites:* Economics 43.100 and the permission of the instructor.

*Day Division:* 1969-70 (lectures two hours a week).

### **Economics 43.345** Agricultural Economics

An examination of the agricultural industry in the national economy and in low income societies. The course will emphasize the working out of the basic forces which determine supply-demand for the industry and the functional distribution of income among the factors of production. The place of institutions will be examined and public policy will be critically reviewed.

*Prerequisite:* Economics 43.100.

*Not offered, 1969-70.*

### **Economics 43.350** Business Finance

A study of the financial aspects of business operations. Topics include the flow of funds within the business, planning for short- and long-term needs for funds, capital structure, expansion and reorganization; the markets for long- and short-term capital.

*Prerequisites:* Economics 43.100 and Accounting 41.100.

*Day Division:* 1969-70 (lectures three hours a week).

### **Economics 43.356\*** Labour Economics and the Theory of Wages

An examination of labour as a factor of production with regard to the origin, structure and function of a 'rational' labour market, and the policy implication thereof with respect to both 'perfect' and 'imperfect' markets.

*Prerequisite:* Economics 43.100.

*Day Division:* 1969-70 (lectures two hours a week, first term).

### **Economics 43.357\*** Industrial Relations and Labour Policy

The theory, structure and functions of trade unions; the history of Canadian trade unions and Public Policy towards them; the development of an industrial relations system and the economics of organizational maintenance and stress.

*Prerequisite:* Economics 43.356\*.

*Day Division:* 1969-70 (lectures two hours a week, second term).

**Economics 43.358\* Human Relations and Organizational Problems**

An examination of selected concepts in the field of goals of the organization; the constraint structure and the responsibilities of management, problems of human resources utilization and the theory and practice of personnel management.

*Prerequisite:* Economics 43.356\* (may be taken concurrently).

*Evening Division:* 1969-70 (lectures and seminars two hours a week, second term).

**Economics 43.361\* International Economics**

Extension of the basic principles of economics to international problems. A discussion of the distinctive theories of international trade and capital flows, illustrated in applications to present-day international economic problems.

*Prerequisite:* Economics 43.100.

*Day Division:* 1969-70 (lectures two hours a week, first term).

**Economics 43.362\* International Monetary Problems**

A discussion of the theory and institutions of the international monetary system, and the related balance of payments problems of nation states.

*Prerequisite:* Economics 43.361\*.

*Day Division:* 1969-70 (lectures two hours a week, second term).

**Economics 43.363\* Economic Development**

A discussion of the principles of economic development. An introduction to their application to the problems of the developing countries, with particular attention to the role of international trade and capital movements in the developing process.

*Prerequisite:* Economics 43.361\*.

*Day Division:* 1969-70 (lectures two hours a week, second term).

**Economics 41.365 Computer Technology Applied to Commerce Problems**

Introduction to digital computer organization and operations. Programming techniques, stressing the use of FORTRAN IV and COBOL. Numerical solution to problems of interest in social and management sciences. Simulation of business problems and the use of business strategies. (This course is also listed as Accounting 41.365).

*Prerequisites:* Mathematics 69.101 and Economics 43.220, or permission of the instructors.

*Day Division:* 1969-70 (lectures two hours a week, laboratory two hours a week).

**Economics 43.366\* Economics of Planning**

An examination of the theoretical problems of economic planning both at the micro and at the macro levels. Investigation of the equilibrium and optimality conditions of centrally directed economic systems. Study of programming techniques and an attempt to establish the foundations of a theory of rational macrodecision. Some economics of information.

*Prerequisites:* Economics 43.200 and 43.210, or permission of the instructor.

*Day Division:* 1969-70 (lectures two hours a week, second term).

**Economics 43.370 The Economics of Socialism**

A survey of the economic theory of socialism is followed by an examination of socialist economics in practice. Emphasis is placed upon the Soviet economy.

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Several Eastern European variants are also considered, in particular the Yugoslav experience with a form of market socialism. An attempt is made to assess the comparative performance of socialist and capitalist economies.

*Prerequisite:* Economics 43.100.

*Evening Division:* 1969-70 (lectures two hours a week).

### **Economics 43.405** Quantitative Methods in Economics and Business

An integration of statistical methods and micro-economic analysis with applications to business and economic decision-making. Special emphasis will be laid upon techniques such as Linear Programming, Non-linear Programming, Game Theory, Waiting Line Theory, Sequencing Theory, Simulation, Inventory Control Systems, and Decision Theory.

*Prerequisites:* Economics 43.200, 43.220; Mathematics 69.100 or 69.101.

*Day Division:* 1969-70 (lectures and seminars two hours a week).

### **Economics 43.410** Finance and Capital Markets

The workings and structure of Canada's capital markets with particular reference to differing classes of institutional lenders and borrowers; relationships of non-bank financial intermediaries to the banking system, regulatory agencies and the public, the impact of these institutions on corporate financial and national economic policy, access to foreign capital markets, and external financing of Canadian economic development.

*Prerequisite:* Economics 43.210.

*Evening Division:* 1969-70 (lectures and seminars two hours a week).

### **Economics 43.415** History of Economic Thought

The crucial achievements in economic theory and doctrine in the nineteenth and twentieth centuries are studied. Special emphasis is given to the interrelationship between the social environment and economic thought — especially to the role of economics in the development of the national state and international institutions.

*Prerequisites:* Economics 43.200 or 43.210, or permission of the instructor.

*Day Division:* 1969-70 (lectures and seminars two hours a week).

### **Economics 43.420** Seminar in Applied Economics

A selection of empirical studies chosen on the basis of their importance and the group's interests will be examined critically and, if possible, extended. Active and intensive participation will be required.

*Prerequisites:* Economics 43.220 and one of 43.200 or 43.210 and permission of the instructor.

*Not offered,* 1969-70.

### **Economics 43.430** Industrial Organization and Public Policy

An analysis of the organization of Canadian industry, with reference to associated U.S. industry where necessary. A few representative industries are examined in some detail. Price theory is used to distinguish economic from institutional factors affecting the structure of the economy. Emphasis is laid upon public policies which affect, intentionally or otherwise, the organization and behaviour of industry, e.g., public utility regulation, control of restrictive practices, commercial policy, and price supports.

*Prerequisite:* Economics 43.200.

*Evening Division:* 1969-79 (lectures and seminars two hours a week).

**Economics 43.440 Public Finance**

A discussion of the theory of public finance, and an examination of several empirical attempts to quantify the theory. Some topics of current interest concerning the public sector in the Canadian economy are examined in the light of the theory and empirical findings.

*Prerequisite:* Economics 43.200.

*Day Division:* 1969-70 (lectures and seminars two hours a week).

**Economics 43.446\* Economic Dynamics: Growth**

An introduction to modern theories of the growth of income. The simple "razor's edge" growth theory of Harrod will lead to an examination of the neoclassical growth theorems. Golden Rules of Accumulation; the role of money in growth and the effects on debtor-creditor position of growth in an open economy will be analysed, together with policies for growth and growth paradoxes.

*Prerequisite:* Economics 43.210.

*Evening Division:* 1969-70 (lectures and seminars two hours a week, first term).

**Economics 43.451\* Economic Dynamics: Business Cycles**

An analysis of the nature and causes of fluctuations in income, prices and employment. Short-run dynamic models arising from multiplier-accelerator and other economic processes will be examined. Cycle simulation; forecasting; stability conditions; anti-cyclical policy and the problems of maximising growth without cycles will be discussed.

*Prerequisites:* Economics 43.446\*, or 43.210, and permission of the instructor.

*Not offered, 1969-70.*

**Economics 43.456\* Economic Development**

An inquiry into the reasons for the failure of most societies to achieve economic development. Reference to the experience of now developed countries will be made. The role of planning, trade, aid and regional integration as possible development strategies will be evaluated.

*Prerequisites:* Economics 43.446\* or 43.210 with permission of the instructor.

*Evening Division:* 1969-70 (lectures and seminars, two hours a week, second term).

**Economics 43.460 International Trade**

An examination of the theory of international trade and payments and its applications. The current body of theory and its historical development are discussed, as are a number of attempts to verify and quantify the theory. A number of present day problems, policies, and institutions are examined in the light of the theory and empirical findings.

*Prerequisites:* Economics 43.200 and 43.210.

*Evening Division:* 1969-70 (lectures and seminars, two hours a week).

**Economics 43.470 Comparative Economic Systems**

A discussion of the structure and functioning of economic systems in theory and practice. Some criteria for evaluating economic performance will be proposed. Such actual contemporary economies as those of the U.S.S.R., U.S.A., France, Yugoslavia, and China will be examined.

*Prerequisite:* Economics 43.200; Economics 43.210 should have been taken, or be taken concurrently; or permission of the instructor.

*Day Division:* 1969-70 (lectures two hours a week).

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### **Economics 43.480** Research Seminar in Urban Economics

An inquiry into the internal dynamics of cities and inter-urban relationships primarily through directed research.

*Prerequisites:* Economics 43.200 and 43.220.

*Not offered, 1969-70.*

### **Economics 43.485** Introduction to Econometrics

Introduction to problems of structural estimation of economic models; single equation estimation and related problems; simultaneous estimation for interdependent systems of linear form; non-linear estimation; Monte Carlo experiments to derive small sample properties of estimators. Some project in structural estimation will be undertaken, or assigned.

*Prerequisites:* Economics 43.200, and 43.220, Mathematics 69.101, or equivalents.

*Evening Division:* 1969-70 (lectures two hours a week).

### **Economics 43.490** Tutorial in Modern Classics

An honours student will be expected, usually in his final year, to read a group of original works selected in consultation with a member of the Department assigned as tutor. The student will meet regularly with his tutor to discuss his readings and to read papers based upon it.

*Prerequisite:* Permission of the Chairman of the Department.

*Day Division:* Annually (tutorial hours arranged)

### **Economics 43.492** Tutorial in Economics

An additional tutorial in economics may be taken subsequent to or concurrently with Economics 43.490.

*Prerequisite:* Permission of the Chairman of the Department.

*Day Division:* Annually.

### **Economics 43.498** Honours Essay

A student taking honours in economics must write an honours essay during his final year. This essay will count for one course credit.

*Prerequisite:* Permission of the Chairman of the Department.

## **Graduate Courses**

All graduate courses require permission of the Chairman of Graduate Studies, Department of Economics.

### a) Qualifying Year Courses

#### **Economics 43.590\*** Micro-Economic Theory

This course is required for Qualifying year students whose preparation in micro-economic theory is judged to be inadequate for graduate work in Economics at Carleton University.

*Day Division:* 1969-70, first term.

#### **Economics 43.591\*** Macro-Economic Theory

This course is required for Qualifying year students whose preparation in macro-economic theory is judged to be inadequate for graduate work in Economics at Carleton University.

*Day Division:* 1969-70, second term.



**Economics 43.592 Statistical Methods**

For Qualifying year students whose statistical training is judged to be inadequate. It covers the fundamental concepts of statistical analysis and will introduce the student to econometric methods.

*Day Division: 1969-70.*

**Economics 43.594 Qualifying Year Tutorial**

A tutorial for Qualifying year students who are required to take the full slate of Qualifying year core courses (micro-economic theory, macro-economic theory, statistical methods, and economic history) in the winter session. It is to be offered in the summer only when numbers warrant it.

*Not offered, 1969-70.*

**b) First Year Courses****Economics 43.500 Economic Theory<sup>(1)</sup>**

A rigorous examination of advanced micro and macro theory sufficient to serve as a basis of the program. The student will be required to draw upon a variety of mathematical concepts as the need arises.

*Evening Division: 1969-70.*

**Economics 43.510\* Workshop in Economic Policy**

Intended primarily to provide students and faculty with an opportunity to think and work together on policy questions. It is viewed as being an avenue for several members of the Department to discuss their research, especially as related to current policy problems, with graduate students.

*Day Division: 1969-70, both terms.*

**Economics 43.515 History of Economic Thought**

(See Economics 43.415)

**Economics 43.520 The Canadian Economy**

A detailed examination of various aspects and related problems of the Canadian economy. Included will be an examination of a number of the following items: the economic development of Canada, and national and regional development policies; the industrial structure and policy to control and promote competition; the structure of factor markets and related policies; the stability of the Canadian economy, and the role of monetary and fiscal policies; the role of international trade and capital movements.

*Day Division: 1969-70.*

**Economics 43.525 Advanced Economic History**

A discussion of methodology applicable to the analysis of economic history. Intensive examination of selected topics in North American and West European economic history.

*Prerequisite:* May be taken by senior undergraduates, with permission of chairman and instructor.

*Evening Division: 1969-70.*

<sup>(1)</sup>This course is equivalent to a one and a half course load.



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### **Economics 43.530** Industrial Organization

*Prerequisite:* Economics 43.200 or equivalent.

*Day Division:* 1969-70.

### **Economics 43.535** Labour Economics

*Prerequisite:* Economics 43.200 or equivalent. May be taken by senior undergraduates with permission of chairman and instructor.

*Not offered,* 1969-70.

### **Economics 43.540** Public Finance

*Prerequisites:* Economics 43.200, 43.210, or equivalent.

*Day Division:* 1969-70.

### **Economics 43.545\*** Capital Theory

*Prerequisite:* Economics 43.210 or equivalent. May be taken by senior undergraduates with permission of chairman and instructor.

*Not offered,* 1969-70.

### **Economics 43.546\*** Economic Dynamics: Growth

(see Economics 43.446\*)

### **Economics 43.551\*** Economic Dynamics: Business Cycles

(see Economics 43.451\*)

### **Economics 43.556\*** Economic Development

(see Economics 43.456\*)

*Prerequisite:* Economics 43.546\* or equivalent.

### **Economics 43.560** International Trade

(see Economics 43.460)

### **Economics 43.570** Comparative Economic Systems

(see Economics 43.470)

### **Economics 43.575** Mathematical Economics

A synthesis of some important topics in economic theory, with almost exclusive use of mathematical models. Some of these are: general equilibrium of the firm and of the household, and related matters; general equilibrium of exchange and production; stability of equilibrium; linear programming, games, and the theory of the firm; selected topics in economic dynamics; value theory; social welfare functions; optimizing techniques and public policy.

*Prerequisite:* Mathematics 69.201, Economics 43.200, 43.210 or equivalent. May be taken by senior undergraduates, with permission of chairman and the instructor.

*Evening Division:* 1969-70.

### **Economics 43.580** Urban Economics

(see Economics 43.480)

### **Economics 43.585** Econometrics

(see Economics 43.485)

**Economics 43.599** M.A. Thesis

## c) Second Year Courses

**Economics 43.600** The Structure of Economic Policy

A fairly abstract analysis of the theoretical foundations of policy that would be sufficiently general to extract the crucial relationships among various policies. To include an examination of the formulation, objectives, role, and interrelationships of economic policy.

*Day Division:* 1969-70.

**Economics 43.610\*** Workshop in Economic Policy

(see Economics 43.510\*).

**Economics 43.616\*** Seminar in the History of Economic Thought

*Prerequisite:* Economics 43.515 or equivalent.

*Day Division:* 1969-70, first term.

**Economics 43.620** Research Seminar in Economics

A forum for the discussion of the specific research interests of the students. The earlier part of the course includes a discussion of research techniques and particularly recent developments in such techniques.

*Day Division:* 1969-70.

Candidates can select from the following list of advanced courses. The courses presented below indicate the areas in which members of the Department are prepared to supervise directed reading, research, and seminars, although not all of the courses will necessarily be offered in any one year.

**Economics 43.626\*** Seminar in Economic History

*Prerequisite:* Economics 43.525 or equivalent.

**Economics 43.631\*** Seminar in Industrial Organization

*Prerequisite:* Economics 43.530 or equivalent.

**Economics 43.636\*** Seminar in Labour and Industrial Relations

*Prerequisite:* Economics 43.535 or equivalent.

**Economics 43.641\*** Seminar in Public Finance

*Prerequisite:* Economics 43.540 or equivalent.

**Economics 43.646\*** Seminar in Growth and Capital Theory

*Prerequisite:* Economics 43.546\* or equivalent.

**Economics 43.656\*** Seminar in Economic Development

*Prerequisite:* Economics 43.556\* or equivalent.

**Economics 43.661\*** Seminar in International Economics

*Prerequisite:* Economics 43.560 or equivalent.

## **Economics**

**Economics 43.666\*** Seminar in Monetary Analysis

*Prerequisite:* Economics 43.500 or equivalent.

**Economics 43.667\*** Seminar in Monetary Research

*Prerequisite:* Economics 43.500 or equivalent.

**Economics 43.671\*** Seminar in Comparative Economic Systems

*Prerequisite:* Economics 43.570 or equivalent.

**Economics 43.676\*** Seminar in Mathematical Economics

*Prerequisite:* Economics 43.575 or equivalent.

**Economics 43.681\*** Seminar in Urban and Regional Economics

*Prerequisite:* Economics 43.580 or equivalent.

**Economics 43.686\*** Seminar in Econometrics

*Prerequisite:* Economics 43.585 or equivalent.

**Economics 43.687\*** Advanced Topics in Econometrics

*Prerequisite:* Economics 43.585 or equivalent.

**Economics 43.691\*** Seminar in Welfare Economics

*Prerequisite:* Economics 43.500 or equivalent.

**Economics 43.696\*** Seminar in Operations Research

*Prerequisites:* Economics 43.505 and 43.575 or equivalent.

**Economics 43.697\*** Selected Advanced Topics

*Prerequisite:* Permission of instructor.

## **d) Third Year Courses**

**Economics 43.699** Ph.D. Thesis

# Engineering

Professor Emeritus	Stanley G. Tackaberry
Professor; Dean of Engineering Professors	D. A. George A. R. Boothroyd, W. H. Bowes, M. A. Gullen, D. A. J. Millar, John Ruptash, W. Wright
Associate Professors	G. W. Bigg, F. W. Black, D. C. Coll, M. A. Copeland, G. D. Cormack, E. B. Fletcher, J. A. Goldak, D. A. Kasianchuk, J. Kirkhope, B. Pagurek, J. C. Vrana
Assistant Professors	A. N. Abdelhamid, M. J. Bibby, R. C. Biggs, S. G. Haider, P. Janzen, A. M. Khan, R. J. Kind, J. P. Knight, W. Makios, R. F. Manuel, S. T. Nichols, E. G. Plett, J. S. Riordon, G. T. Suter, R. E. Thomas, C. R. Thompson, J. Y. Wong
Laboratory Demonstrator	J. C. Patry
Sessional Lecturers	D. W. Brooks, D. M. Caughey, E. P. Cockshutt, W. R. Davis, J. B. Findlay, D. G. Gould, C. D. Holmes, E. V. Jull, A. R. Kaye, J. D. MacDonald, M. D. Olson, D. F. Page, J. Ploeg, S. Tavares, D. A. Wright
Division Chairmen	A. R. Boothroyd — Circuits, Electromagnetics, Electronic Devices, and Materials D. A. George — Computing, Communications, Control and Power Systems D. A. J. Millar — Fluid Mechanics, Heat Transfer and Thermodynamics W. Wright — Solid Mechanics, Structural and Mechanical Analysis and Design
Group Co-ordinator	D. A. Kasianchuk — Soil Mechanics, Foundations and Transportation

## Undergraduate Studies

Candidates for the Bachelor of Engineering degree are required to complete a program of study covering four years after Senior Matriculation. The admission requirements and programs of study for each of the four years are outlined on pp. 56-59.

### Engineering 81.110 Mechanics I

Vectors and vector algebra; composition and resolution of forces and force systems; first moments and centroids; equilibrium and applications; friction; shear and moment diagrams; fluid statics; suspended cables; virtual work; potential energy; stability.

Lectures two hours a week, both terms.

*Text:* Beer and Johnston, *Mechanics for Engineers, Statics*.

*E. B. Fletcher, J. Kirkhope*

### Engineering 81.211 Mechanics II

Kinematics and dynamics of a particle; momentum principles; kinematics and dynamics of rigid bodies; principles of work and energy.

Lectures three hours a week, second term.

Problem analysis three hours a week, second term.

*Text:* Meriam, *Dynamics*

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*Reference:* Beer and Johnston, *Mechanics for Engineers*.

*G. W. Bigg, P. Janzen, and J. Y. Wong*

### Engineering 81.220 Mechanics of Materials I

Stress; strain; factor of safety; Hooke's Law for normal and shearing stresses; Poisson's ratio; torsion of circular, rectangular and thin-walled members; membrane analogy for torsion; stress concentrations; shear force and bending moment diagrams; flexural and shear stress in beams; shear in beams; deflection of beams by double integration; combined axial and bending stresses: plane stress and strain; Mohr's circle; principal stresses and strains; thin-walled pressure vessels; elastic buckling; introduction to electrical resistance strain gauges.

Lectures three hours a week, first term.

Problem analysis and laboratory three hours a week, first term.

*Text:* Byars and Snyder, *Engineering Mechanics of Deformable Bodies*.

*Reference:* Higdon, Olsen and Stiles, *Mechanics of Materials*.

*D. A. Kasianchuk, G. T. Suter*

### Engineering 81.321 Mechanics of Materials II

Statically indeterminate problems in tension and compression, thermal stresses, concentrically and eccentrically loaded connections with rivets, bolts or welds in shear or tension; plastic bending of beams, beams of two materials, unsymmetrical bending, shear center; deflection due to unsymmetrical bending, deflection due to shear; introduction to strain energy; statically indeterminate problems in bending by the method of superposition, continuous beams with elastic supports or settlement of supports; the Euler formula for columns, effective column length, the tangent modulus formula, the secant formula, design formulae for columns; lateral buckling of beams; design for combined compression and bending; triaxial stresses, failure theories; the effect of high and low temperatures on metals; fatigue.

Lectures two hours a week, second term.

Problem analysis and laboratory three hours a week, second term.

*Text:* Popov, *Introduction to Mechanics of Solids*.

*Reference:* Timoshenko and Young, *Elements of Strength of Materials*.

*P. Janzen, J. Kirkhope and G. T. Suter*

### Engineering 81.411 Introduction of Solid Mechanics

Basic considerations of stress and strain. Introductory elasticity, selected topics from the theory of: beams, curved beams, stability, plates, stress concentrations, fatigue, torsion. Numerical and experimental stress analysis.

Lectures two hours a week, first term.

Problem analysis three hours alternate weeks, first term.

*Text:* Housner and Vreeland, *The Analysis of Stress and Deformation*.

*References:* Juvinall, *Stress, Strain and Strength*.

Dally and Riley, *Experimental Stress Analysis*.

*G. W. Bigg*

### Engineering 82.420 Introduction to Structural Analysis

Review of plane statics; analysis of statically determinate plane trusses; elementary elastic and inelastic stability analysis of simple beam, column, and plate structures; influence lines for predicting maximum effects under moving loads; elementary plastic analysis of indeterminate structures; determination of structural deflections.

Lectures three hours a week, first term.



Laboratory and problem analysis three hours alternate weeks, first term.

*Text:* Timoshenko and Young, *Theory of Structures*.

*Reference:* Norris and Wilbur, *Elementary Structural Analysis*.

*R. F. Manuel*

### **Engineering 82.421 Analysis of Elastic Structures**

Theorems relating to elastic structures; analysis of indeterminate elastic structures by the compatibility method; analysis of continuous beams and frames by the slope deflection method of analysis and the moment distribution method of analysis, taking into account the presence or absence of lateral restraint; analysis of statically determinate space structures; elementary plate analysis.

Lectures two hours a week, second term.

Laboratory and problem analysis three hours alternate weeks, second term.

*Text:* Timoshenko and Young, *Theory of Structures*.

*Reference:* Norris and Wilbur, *Elementary Structural Analysis*.

*R. F. Manuel*

### **Engineering 82.423 Reinforced Concrete**

Properties of concrete; mix design and use of admixtures; curing requirements, shrinkage; creep and temperature effects; ultimate strength and working stress; analysis and design of rectangular beams with tension and compression reinforcement and T beams; diagonal tension; bond; design of web reinforcement; two way and flat slabs; yield-line theory for slabs; concentrically and eccentrically loaded columns; footings; introduction to prestressed concrete.

Lectures three hours a week, second term.

Problem analysis and laboratory three hours a week, second term.

*Text:* Winter, Urquhart, O'Rourke and Nilson, *Design of Concrete Structures*.

*References:* Ferguson, *Reinforced Concrete Fundamentals*.

National Building Code of Canada, Part 4—Design.

A.C.I. Building Code Requirements for Reinforced Concrete.

*G. T. Suter*

### **Engineering 82.425 Design of Structural Components**

Determination of loads; factors of safety; properties of structural steels; the design of axially loaded tension and compression members; design of rolled steel shapes in flexure; design of simple and eccentric, welded and bolted connections; design of welded and bolted splices; design of members with combined compression and flexure; design of moment resisting connections, base plates.

Lectures three hours a week, first term.

Problem analysis three hours alternate weeks, first term.

*Text:* McGuire, *Steel Structures*.

*Reference:* National Building Code of Canada.

CISC Handbook of Steel Construction.

*W. Wright*

### **Engineering 82.426 Design of Steel Structures**

Structural loads and design procedures; design of plate girders, built-up compression members and trusses, rigid frames; design of bridges, single and multi-storey buildings; plastic design; economic considerations and cost estimates.

Lectures two hours a week, second term.

Problem analysis three hours alternate weeks, second term.



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*Text:* McGuire, *Steel Structures*.

*References:* National Building Code of Canada

CISC Handbook of Steel Construction

CSA Standard S6-1966-Design of Highway Bridges.

*W. Wright*

### Engineering 82.428 Foundation Engineering

Procedures for the analysis, design and construction of foundations and earth structures, with emphasis on the relationship between theoretical soil mechanics and soils engineering.

Lectures two hours a week, second term.

Problem analysis three hours alternate weeks, second term.

*Text:* Teng, *Foundation Design*.

*References:* Terzaghi and Peck, *Soil Mechanics in Engineering Practice*.

Peck, Hanson and Thornburn, *Foundation Engineering*.

*D. A. Kasianchuk*

### Engineering 83.424 Soil Mechanics

Identification and classification; soil structure and clay mineralogy; void ratio, water content and unit weight relationships; compaction; neutral and effective stresses; permeability flow nets; one-dimensional consolidation; stress distribution; shear strength; stability of slopes; earth pressure.

Lectures three hours a week, first term.

Laboratory three hours alternate weeks, first term.

*Text:* Terzaghi and Peck, *Soil Mechanics in Engineering Practice*.

*References:* Taylor, *Fundamentals of Soil Mechanics*.

Bishop and Henkel, *The Measurement of Soil Properties in the Triaxial Test*.

*E. B. Fletcher*

### Engineering 84.104 Surveying

Surveying principles and practice; measurements of distance, difference in elevation, angles and directions; theory, use and adjustments of principal surveying instruments; theory of errors and weighted measurements; engineering surveys, profile, cross sections, earthwork, horizontal and vertical curves; use of rectangular coordinates in surveying; area computation by surveying methods; principles of aerial photography. Handling of equipment, note-keeping, and surveying procedures are stressed in the field work.

Lectures and field work three weeks at the end of the second term.

*Text:* Davis, Foote and Kelly, *Surveying: Theory and Practice*, 5th edition.

*D. W. Brooks*

### Engineering 84.429 Highway Engineering

Highway planning, economics and finance; highway location and geometric design; traffic engineering; highway drainage and subgrade structure; structural analysis and design of rigid and flexible pavements; mineral aggregates; bituminous mix design; principles of frost action and applications to highway design.

Lectures two hours a week, second term.

Laboratory and problem analysis three hours alternate weeks, second term.

*Text:* Oglesby and Hewes, *Highway Engineering*.

*References:* Ritter and Paquette, *Highway Engineering*.

Woods, *Highway Engineering Handbook*.

Yoder, *Principles of Pavement Design*.

*D. A. Kasianchuk*

**Engineering 84.433 Urban Planning**

A study of the structure and functions of an urban community. Planning surveys, elements of the development plan, land use zoning, requirements and location of industry, commercial and residential development, and the role of transportation are studied. Theories for urban growth and regional development are discussed.

Lectures two hours a week, first term.

Laboratory and problem analysis three hours alternate weeks, first term.

*References:* Webster, *Urban Planning and Municipal Public Policy*.

Walker, *The Planning Function in Urban Government*.

Gallian, *The Urban Pattern*.

Local Planning Administration.

A. M. Khan

**Engineering 84.434 Transportation**

General function of transportation; objectives of transportation systems and transportation planning; historical, administrative and financial status of various modes of Canadian transportation; planning, design and economic evaluation of transportation systems; urban transportation needs, study and forecasting techniques, plan preparation and evaluation.

Lectures two hours a week, second term.

Laboratory and problem analysis three hours alternate weeks, second term.

*References:* Owen, *Strategy for Mobility*.

Hall, *A Methodology for Systems Engineering*.

Hutchinson, et al., *Planning Urban Transportation Systems*.

Oglesby and Hewes, *Highway Engineering*.

A. M. Khan

**Engineering 86.270 Introduction to Materials Engineering**

Crystallography—space lattices, planes and directions in crystals. Crystal structures of the elements and some binary alloys. Phase diagrams, the phase rule, solid solutions, ordering and clustering. Changes of state—solidification, zone refining, the eutectic and peritectic systems. Solid state transformations—the martensite and eutectoid transformations, reaction rates and precipitation hardening. Imperfections in crystals, vacancies, dislocations, grain boundaries. Plastic deformation. Semiconductor materials.

Lectures three hours a week, second term.

Problem analysis and laboratory three hours a week, second term.

*Text:* Richman, *An Introduction to the Science of Metals*.

M. J. Bibby and J. A. Goldak

**Engineering 86.471 Materials Engineering**

Analysis of failure due to fatigue, wear and corrosion. Forming, fabrication and joining of materials.

Lectures two hours a week, first term.

Laboratory three hours alternate weeks, first term.

*Reference:* Lindberg, *Materials and Manufacturing Technology*.

Recent publications.

J. A. Goldak

**Engineering 86.475 Electronic Properties of Materials**

Electron energies in solids. Electron emission. Electrical conduction. Semiconductor materials. Magnetism and magnetic materials. Dielectrics.

## Engineering

Lectures two hours a week, first term.

Laboratory three hours alternate weeks, first term.

*Text:* Rose, Shepherd and Wulff, *The Structure and Materials*. Vol. IV on Electronic Properties.

*Reference:* Hutchison and Baird, *The Physics of Engineering Solids*.

*M. J. Bibby*

## Engineering 87.100 Engineering Drawing and Geometry

Selection and use of instruments; lettering; applied geometry; orthographic projection; freehand and instrument drawing; auxiliary and oblique views; sections and conventions; pictorial sketching and drawing including isometric, oblique and perspective; dimensions and notes, including precision and limit dimensions; screw threads; fasteners; use of piping and welding symbols; detail and assembly drawings; elements of structural drawings; descriptive geometry including point, line, plane problems, curved and warped surfaces, intersections and developments; use of reference books, handbooks and catalogues; introduction to simplified practice in engineering drawing.

Lectures one hour a week, both terms.

Laboratory five hours a week, both terms.

*Texts:* French and Vierck, *Engineering Drawing*, 10th edition.

Wellman, *Technical Descriptive Geometry*, 2nd edition.

*S. G. Haider*

## Engineering 87.312 Mechanics of Machines I

Introduction to mechanisms; simple, compound and epicyclic gear trains; static and dynamic balance—rotors and reciprocating engines; mechanical vibration—free and forced vibration, damping, systems having one and two degrees of freedom.

Lectures three hours a week, first term.

*Text:* Phelan, *Dynamics of Machinery*.

*References:* Timoshenko, *Vibration Problems in Engineering*.

Ham, Crane and Rogers, *Mechanics of Machinery*.

*G. W. Bigg, J. Kirkhope, and J. Y. Wong*

## Engineering 87.401 Mechanical Analysis and Design

Approach to design; stress analysis; design factors; properties of materials; stress concentration, notch sensitivity and fatigue; curved beams; columns with axial and transverse loading; power screws; screw fastenings and connections subject to variable loads; shafts; funicular polygon method of determining the elastic curve and critical speed of shafts, general case; springs; journal and plane bearings; rolling bearings; belt and chain drives; spur, helical, bevel, hypoid and worm gearing; couplings, brakes and clutches.

Lectures two hours a week, both terms.

Problem analysis three hours alternate weeks, first term.

Problem analysis three hours a week, second term.

*Text:* Faires, *Design of Machine Elements*.

*References:* Merritt, *Gears*.

Dudley, *Practical Gear Design*.

Shigley, *Mechanical Engineering Design*.

Spotts, *Design of Machine Elements*.

*W. H. Bowes*

**Engineering 88.414** Vibration Analysis

Multi-degrees of freedom systems; the flexibility and transfer matrices, orthogonality principles, sweeping matrices for lower modes, Holzer type problems, branched systems, electrical analogs and mobility methods. Continuous systems; longitudinal, torsional and flexural free and forced vibrations of prismatical bars. Vibrations of membranes and plates. Vibration measurements and analysis of records.

Lectures two hours a week, first term.

Laboratory three hours alternate weeks, first term.

*References:* Thomson, W. T., *Vibration Theory and Applications*.

Timoshenko, *Vibration Problems in Engineering*.

P. Janzen

**Engineering 88.437** Mechanics of Flight

Introduction to mechanics of flight; elements of theoretical and experimental aerodynamics; aerodynamic characteristics of airfoils and wings at low and high speeds, airplane drag estimation; performance characteristics of propulsive systems; airplane performance analysis including take-off, landing, rate of climb, maximum speed, range, endurance, etc.; static stability and control problems and analysis.

Lectures three hours a week, first term.

*Prerequisite:* Engineering 89.330 or equivalent.

*References:* Dommasch and Connolly, *Airplane Aerodynamics*, 4th edition.

Etkin, *Dynamics of Flight*.

Miele, *Flight Mechanics* Vol. I: *Theory of Flight*.

J. Ruptash

**Engineering 88.447** Heating, Ventilating and Air Conditioning

Comfort. Environmental demands for residential, commercial and industrial systems. Methods of altering and controlling environment. Air distribution. Refrigeration methods, equipment and controls. Integrated year-round air-conditioning and heating systems; heat pumps. Cooling load and air-conditioning calculations. Thermal radiation control. Component matching. System analysis and design.

Lectures two hours a week, second term.

Problem analysis three hours alternate weeks, second term.

*Text:* Stoecker, *Refrigeration and Air-conditioning*.

*Reference:* Carrier, Cherne, Grant and Roberts, *Modern Air-conditioning, Heating and Ventilating*.

F. W. Black

**Engineering 88.452** Control Systems and Instrumentation

Transfer functions, block diagram algebra, stability, steady state errors, types of control systems, root-locus method, frequency response, Bode construction, Nichol's charts, Nyquist stability criterion; servomechanism equalization; modes of control. Study of basic pneumatic and hydraulic control loops for level, position, speed, and inertial guidance controls with emphasis on the response of the transducers and instruments' response. Laboratory activities will include the synthesis and analysis of control loops and components.

Lectures two hours a week, first term.

Laboratory three hours alternate weeks, first term.

*Text:* Raven, *Automatic Control Engineering*.

*References:* Welbourn, *Essentials of Control Theory for Mechanical Engineers*, Kuo, *Automatic Control Systems*.

C. R. Thompson



## Engineering

### Engineering 89.330 Fluid Mechanics

Fundamental concepts; properties of fluids; fluid statics; fluids in relative equilibrium; fundamental equations for steady one-dimensional nonviscous incompressible flow; selected applications; dimensional analysis, dynamic similarity; laminar flow, turbulent flow, boundary layer, skin friction, and drag estimation; pipe line problems; open channel flow; one-dimensional steady isentropic flow, shock waves; elements of two-dimensional steady nonviscous incompressible flow.

Lectures two hours a week, both terms.

Laboratory three hours alternate weeks, both terms.

*Text:* Vennard, *Elementary Fluid Mechanics*, 4th edition.

*Reference:* Streeter, *Fluid Mechanics*.

*F. W. Black, R. J. Kind, and J. C. Vrana*

### Engineering 89.431 Hydrology

Hydrologic cycle; stream flow, hydrology of snow; subsurface water, hydraulics of wells; unit hydrograph and S-curve analysis of flood flows; infiltration, river and reservoir routing; introduction to statistical inference and time series analysis of hydrologic data.

Lectures two hours a week, first term.

Laboratory three hours alternate weeks, first term.

*Text:* Butler, *Engineering Hydrology*.

*References:* Chow, *Handbook of Applied Hydrology*.

DeWeist, *Geohydrology*.

Linsley, Kohler and Paulhus, *Hydrology for Engineers*.

Wisler and Brater, *Hydrology*.

*J. Ploeg*

### Engineering 89.432 Fluid Dynamics

Equations of fluid dynamics for elementary control volume in common coordinate systems. Incompressible nonviscous flow. Compressible steady nonviscous flow: isentropic one-dimensional flow; normal and oblique shock waves; expansion waves; wave interaction and reflection; introduction to unsteady flow. Viscous flow: Navier-Stokes equation; Poiseuille flow; Couette flow; hydrodynamic lubrication: boundary layers; Blasius solution; approximate methods and solutions; drag; boundary layer growth and stability; separation; control techniques.

Lectures three hours a week, first term.

*References:* Shapiro, *Dynamics and Thermodynamics of Compressible Fluid Flow*, Vol. 1.

Eskinazi, *Principles of Fluid Mechanics*.

*E. G. Plett*

### Engineering 89.435 Fluid Machinery

Purposes and types of fluid machines. Hydrostatic, hydrodynamic machines. Performance parameters; dimensional analysis and similarity. Performance testing. Effect of inlet conditions, cavitation, compressibility and viscosity. The Euler Pump and Turbine Equation. Velocity diagrams, reaction. Axial flow machines; propellers, turbines, fans, compressors. Radial and mixed flow machines; pumps, turbines, entry and exit volutes. Torque converters and fluid couplings; hydraulic transmissions. Fluid handling systems and system component matching. Equilibrium and transient running points. System dynamics and stability with parallel and series operation. Water hammer, collapse of penstocks.

Lectures two hours a week, second term.

Laboratory three hours alternate weeks, second term.

*References:* Shepherd, *Principles of Turbomachinery*.

Kovats, *Design and Performance of Centrifugal and Axial Flow Pumps and Compressors*.

Norrie, *An Introduction to Incompressible Flow Machines*.

A.S.M.E., *Cavitation in Fluid Machinery*.

J. C. Vrana

### **Engineering 89.436 Hydraulic Structures**

Open channel flow; channel transitions and controls; arch, earth and gravity dams; spillways, weirs, gates and culverts; mechanics of sedimentation in reservoirs and rivers; fluvial morphology and river engineering.

Lectures two hours a week, second term.

Problem analysis and laboratory three hours alternate weeks, second term.

*Text:* Morris, *Applied Hydraulics in Engineering*.

*References:* Blench, *Regime Behaviour of Canals and Rivers*.

Chow, *Open-Channel Hydraulics*.

Creager, Justin and Hinds, *Engineering for Dams*.

Linsley and Franzini, *Water Resources Engineering*.

*Lecturer to be announced*

### **Engineering 90.340 Thermodynamics**

Basic concepts of heat, work, temperature, property, state, system, control volume. The First Law for systems and control volumes with applications, Properties of pure substances, phase diagrams. The Perfect gas laws and relations. The Second Law and its corollaries, entropy from classical and statistical approach. Introduction to Kinetic theory of gases. Properties of gas mixtures.

Lectures three hours a week, first term.

Problem analysis and laboratory three hours a week, first term.

*Text:* Spalding and Cole, *Engineering Thermodynamics*, 2nd edition.

A. N. Abdelhamid, R. C. Biggs and F. W. Black

### **Engineering 90.341 Introduction to Heat Transfer**

Analytical, analog and numerical methods of determining temperature distribution and heat flow in regions with steady-state heat conduction in one and two dimensions. Transient heat conduction problems. Heat exchange by radiation between black and grey surfaces; solar radiation. Heat transfer to fluids flowing through ducts. Free and forced convection at cylindrical and plane surfaces. Boiling and condensation. The lectures are supplemented by laboratory experiments.

Lectures two hours a week, second term.

Laboratory three hours alternate weeks, second term.

*Text:* Kreith, *Principles of Heat Transfer*.

R. C. Biggs, R. J. Kind and E. G. Plett

### **Engineering 90.442 Applied Thermodynamics**

Properties and processes of gases and vapours; development and use of property charts and tables. Psychrometry, combustion. Heat engine cycles and plants: vapor cycles; steam power plants, compression and absorption refrigerators; desalination; gas cycles; internal combustion engines, gas turbine engines, air cycle refrigerators.



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Elements of propulsion plants; turboprops, turbofans, turbojets; rockets. Principles of turbomachines. Power system analysis, component matching and off-design performance estimation.

Lectures three hours a week, both terms.

Laboratory three hours alternate weeks, both terms.

*References:* Jones and Hawkins, *Engineering Thermodynamics*.

Haywood, *Analysis of Engineering Cycles*.

Soo, *Thermodynamics of Engineering Science*.

D. A. J. Millar

### Engineering 90.443 Energy Conversion

Fundamental concepts of direct energy conversion devices: irreversible thermodynamics, electron energy level diagrams, solid state and p-n junction theory, Maxwell's equations and plasma equations. Principles of operation of fuel cells, thermoelectric systems, solar cells, magnetoplasmadynamic devices, electrogasdynamic devices, fusion reactors. Principles, design, operation and control of nuclear reactors. Lectures two hours a week, second term.

Laboratory three hours alternate weeks, second term.

*References:* Soo, *Direct Energy Conversion*, Walsh, *Energy Conversion*.

A. N. Abdelhamid

### Engineering 93.351 Fundamentals of Electric Circuits

An introduction to the theory of linear passive networks. Strong emphasis is placed on Laplace transform methods for circuit analysis. Topics include transient analysis, generalized solutions, poles and zeros, transfer functions, Bode and Nyquist diagrams, loop and node analysis, super-position, Thevenin's and Norton's theorems, treatment of initial conditions and sinusoidal steady state analysis.

Lectures three hours a week, first term.

Laboratory and problem analysis three hours a week, first term.

*Text:* Del Toro, *Principles of Electrical Engineering*.

G. D. Cormack, D. A. George and R. E. Thomas

### Engineering 93.357 Electronics I

Diodes: SCR's and related devices: piecewise linear circuits. The transistor: small signal circuits, biasing. Vacuum tubes and FET's: small signal circuits. Differential amplifiers. Switching and logic circuits.

Lectures three hours a week, second term.

Laboratory three hours alternate weeks, second term.

*Texts:* Fitzgerald, Higginbottom, Grabel, *Basic Electrical Engineering*.

Dean, *Integrated Circuits*.

M. A. Copeland, J. P. Knight and R. E. Thomas

### Engineering 93.458 Electronics II

After first emphasising reasonably precise analysis of active networks performing a wide variety of functions the course introduces the student to the techniques of circuit design. Topics are chosen from logic gates, multivibrators, voltage and current sweeps; the properties of linear active quadripoles, terminal admittances, stability criteria, optimum power gain and unilateralisation; small signal narrow-band amplifiers, power amplifiers at audio and radio-frequency; oscillators, modulating systems, frequency-changing and demodulating systems. The laboratory involves the student in five or six design projects.

Lectures two hours a week, first term; three hours a week second term.

Laboratory three hours a week, first term; three hours alternate weeks, second term.

*Texts:* Millman and Taub, *Pulse, Digital and Switching Waveforms*.

Seeley, *Electronic Circuits*.

*References:* S.E.E.C. Volumes 4, 6 and 7.

*M. A. Gullen*

#### **Engineering 94.451 Signal Processing**

Mathematical representations for signals, Laplace transforms, series expansions, Fourier transforms, amplitude and phase spectra, power spectra, convolution and correlation methods, signal sampling. Amplitude, frequency and phase modulation, demodulation, suppressed band systems, multiplexing, noise spectra, signal detection in the presence of noise.

Lectures three hours a week, second term.

*References:* Lathi, *Signals, Systems and Communication*.

Javid and Brenner, *Analysis, Transmission and Filtering of Signals*.

*S. T. Nichols*

#### **Engineering 94.455 Feedback Control Systems**

Review of Laplace transform methods. Transfer functions. Block diagrams. Stability. Frequency response; Bode plots, Nyquist criterion. Root Locus. Compensation. Analogue computation. An introduction to state variable methods.

Lectures three hours a week, first term.

*Text:* Dorf, *Modern Control Systems*.

*J. S. Riordon*

#### **Engineering 94.456 Feedback Control Laboratory**

Experimental determination of system characteristics by step, a.c. steady state and general excitation testing. Compensation design. A.C. Systems. Component characteristics and selection. Effects of common nonlinearities. Laboratory work involves the use of the analogue computer, measurements on d.c.\*and a.c. control systems, and system design. Electrical, electromechanical and mechanical control systems may be studied.

Lectures one hour a week, second term.

Laboratory three hours a week, second term.

*References:* Dorf, *Modern Control Systems*.

Ahrendt and Savant, *Servomechanisms Practice*.

*B. Pagurek*

#### **Computing Science 95.100 Basic Computer Programming**

An introduction to computing, intended to provide the student with the basic knowledge and experience to use the computer as a tool for solving problems. Content includes: the algorithmic approach to problem solving, flowchart diagrams and program structure, the organization and characteristics of computers and input/output devices, internal and external data representations, the FORTRAN programming language, an introduction to COBOL. Computer solution of numerical and non-numerical problems will be discussed.

Lectures two hours a week, workshop two hours a week, both terms.

*J. D. MacDonald*

## Engineering

### Computing Science 95.200\* Introduction to Computing Science I

Program structure, flowchart diagrams, algorithms and algorithmic languages. Computer organisation: input and output devices; core, disc, drum and tape storage systems; arithmetic operations and control. Programming languages, the FORTRAN vocabulary, subroutines, supervisory systems, program libraries. The workshops are intended to allow development of substantial FORTRAN programming skill. Elementary topics in numerical analysis are introduced as procedures for flowcharting and programming.

*Prerequisite:* Mathematics 69.100 or 69.101.

Lectures two hours a week, workshop two hours a week, first term.

*Text:* Davis, *An Introduction to Electronic Computers*.

*M. A. Gullen*

### Computing Science 95.201\* Introduction to Computing Science II

Computer structure; parallel and serial processing, fixed and variable word length stores, machine instructions, address formats, address modification, indirect addressing, multilevel stores. Instruction sets, machine and assembly language programming, higher level languages, organisation of the object program. Data structures; lists, strings, arrays, trees, stacks; storage organisation, segmentation and linkage. Examples of high level languages which include data management features.

Lectures two hours a week, workshop two hours a week, second term.

*Text:* Davis, *An Introduction to Electronic Computers*.

*References:* Richards, *Electronic Digital Systems*.

Rosen, *Programming Language and Systems*.

*M. A. Gullen*

### Engineering 95.265 Introduction to Computer Programming

Introduction to the IBM 1620 Data Processing System. Machine organization: the stored program, addressing, branching, looping. The IBM 1620 machine language. Programming with the FORTRAN language. Numerical methods: roots of transcendental equations, finite difference approximations, forward integration. Matrix methods: multiplication, inversion, solution of simultaneous equations.

Lectures one hour a week, both terms.

Laboratory one hour a week, both terms.

*Text:* McCormick and Salvadori, *Numerical Methods in Fortran*.

*D. C. Coll and W. R. Davis*

### Computing Science 95.300\* Programming Languages and Supervisory Systems

Syntax and semantics of simple arithmetic expressions and statements, Backus normal form for representations. Precedence relations and grammars, application to code generation. Structure of algorithmic languages: program constituents; procedures, formal and actual parameters, recursive procedures; syntactic specifications, concepts of syntactic analysis. List processing and string manipulation languages. Formal description of languages and their processors.

Batch processing systems; loading and subroutine linkage.

Multiprogramming and multiprocessor systems.

Lectures three hours a week, first term.

*References:* Iverson, *A Programming Language*.

Wegner, *Programming Languages, Information Structures and Machine Organisation*.

Martin, *Design of Real-Time Computer Systems*.

*Not offered, 1969-70.*

**Engineering 95.366** Computer Applications

Analysis of engineering problems with the use of the digital computer, including mathematical modelling, organization of the equations, and methods of solution using analytical and numerical methods. Topics in numerical methods include: solution of single algebraic and transcendental equations and sets of linear algebraic equations, determination of eigen values and eigen vectors; curve fitting by difference and least squares methods; numerical integration, differentiation; solution of ordinary and partial differential equations. These methods are illustrated by application to typical engineering problems. An important part of the course is the analysis and solution, by the student, of a substantial engineering problem using the IBM 1620 or GE 415 computer.

Lectures three hours a week, first term.

*Text:* James, Smith and Welford, *Applied Numerical Methods*.

*References:* Salvadori and Baron, *Numerical Methods in Engineering*.

Crandall, *Engineering Analysis*.

*J. P. Knight, J. Y. Wong*

**Computing Science 95.400\*** Computer Organisation and Applications

Data representation and transfer; coding and decoding of character information, clearing, gating. Arithmetic circuits; multiplication and division algorithms, carry propagation, speedup techniques. Digital storage and accessing; core memory structure, control, data and address buses, overlapping and interleaving, protection and dynamic relocation; characteristics of surface recording devices. Control functions; instruction vocabulary, decoding and sequencing networks, interrupt sensing and processing. System organisation; interfaces, simplex and multiprocessor machines, special purpose computers, hybrid computers. Simulation techniques.

*Prerequisite:* Engineering 95.466.

Lectures three hours a week, second term.

*References:* Bartee, Lebow and Reed, *Theory and Design of Digital Machines*.

Gschwind, *Design of Digital Computers*.

Maley and Shiko, *Modern Digital Computers*

*D. C. Coll and M. A. Gullen*

**Engineering 95.466** Switching Circuits

Introduction: Gates, number systems, relay networks. Combinatorial circuit design: canonical forms, switching algebra, maps, prime implicant tables, multiple output networks. Electronic switching circuits: diode and transistor gates, RTL, DTL, TTL, ECL; flipflops. Analysis of sequential switching circuits: fundamental, pulse, and clocked modes. State diagrams. Synthesis of sequential circuits: word description, state diagrams, flow tables, internal variable assignments, excitation tables, realization. Races and hazards. Basic circuits: registers, counters, adders. Examples and applications.

Lectures three hours a week, first term.

*Text:* McCluskey, *Introduction to the Theory of Switching Circuits*.

*D. C. Coll*

**Engineering 96.468** Solid State Electronics

Fundamentals of solid state physics. Injection and current flow processes in a semiconductor. Theory of the p-n junction; diode mechanism and characteristics. Bipolar transistor: internal theory, dc characteristics, charge control, Ebers-Moll



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relations; high frequency and dynamic properties, hybrid- $\pi$  model. Device fabrication technology. Field effect transistors. Integrated circuits. Special purpose devices.

Lectures three hours a week, first term.

Laboratory three hours alternate weeks, first term.

*Text:* S.E.E.C. Vols. I and II.

*Reference:* Gibbons, *Semiconductor Electronics*.

*J. P. Knight*

### Engineering 96.469 Semiconductor Devices and Circuits

Design considerations for semiconductor devices: diodes, bipolar transistors, field effect transistors, devices for integrated circuits. Fabrication processes: monolithic planar process, thin film processes. Integrated circuits: active and passive devices, isolation, large scale integration. Design of integrated circuits: linear circuits, digital circuits.

Lectures two hours a week, second term.

Laboratory three hours alternate weeks.

*Prerequisite:* Engineering 96.468.

*Reference:* Warner and Fordemwalt (Motorola), *Integrated Circuits*.

*A. R. Boothroyd*

### Engineering 97.453 Electric Transmission and Radiation

Introduction to guided waves. Transient and steady-state solution of the transmission line equations. Properties of transmission lines, standing waves, impedance; effect of loading. Impedance charts, matching techniques. Lines at radio frequencies. Lines at power frequencies. Waveguides and cavities. Radiation from charge and current distributions, antennas. Near and far field of a radiator, approximations. Wire antennas, gain directivity. Introduction to arrays and apertures.

Lectures three hours a week, second term.

Laboratory three hours alternate weeks, second term.

*Text:* Jordan, *Electromagnetic Waves and Radiating Systems*.

*References:* Atwater, *Introduction to Microwave Theory*.

Ryder, *Networks, Lines and Fields*.

*G. D. Cormack*

### Engineering 97.454 Electromagnetic Fields

Vector analysis. The concept of fields. Gradient, divergence, curl and Laplacian. Divergence theorem, Stoke's theorem, Green's theorems. Electrostatic fields, Coulomb's law, Gauss' law, Poisson and Laplace equations. Image and iteration techniques. Boundary value problems. Force and energy. Magnetostatic fields, Ampere's laws, Biot-Savart law. Time varying fields, Maxwell's equations. Reflection and refraction of plane waves.

Lectures three hours a week, first term.

*Text:* Plonsey and Collin, *Principles and Applications of Electromagnetic Fields*.

*References:* Reitz and Milford, *Foundations of Electromagnetic Theory*.

Hayt, *Engineering Electromagnetics*.

*W. Makios*

### Engineering 98.361 Introduction to Electric Machines

Elements of three phase circuits and power systems transformers, Fourier analysis, fundamental alternating and direct current machines. The direct current machine is modelled and studied in transient and steady state situations and with feedback. Block diagram manipulation and analogue computer simulation.



Lectures three hours a week, second term.

Laboratory three hours alternate weeks, second term.

*Text:* Del Toro, *Principles of Electrical Engineering*.

*M. A. Copeland, W. Makios and S. T. Nichols*

### **Engineering 98.462 Electrical Machines**

The course is conducted largely in the laboratory. Students, under broad guidance, are expected to devise and perform experiments on the dynamic operation and control of electrical machinery and related power transmission systems. The laboratory includes both Mawdsley and Westinghouse generalised machines and central distribution facilities allow the interconnection of various groups of machines.

Lectures one hour a week, second term.

Laboratory three hours a week, second term.

*Reference:* Chapman, *Electromechanical Energy Conversion*.

*Not offered, 1969-70.*

### **Engineering 99.497 Engineering Project**

As a part of the fourth year program, each student is required to select and complete a major project in engineering analysis, design, development or research. The objective is to provide an opportunity to develop initiative, self reliance, creative ability, and engineering judgement. The results must be submitted in a comprehensive report with appropriate drawings, charts, bibliography, etc. Each student is required to submit his engineering project proposal to the Dean of Engineering on or before October 1.

*Members of the Faculty*

### **Graduate Studies**

The Faculty of Engineering offers courses of graduate study leading to the M.Eng. and Ph.D. degrees in the fields of Aeronautical Engineering, Civil Engineering, Electrical Engineering, Mechanical Engineering and Materials Engineering. The regulations governing graduate studies are outlined on pp. 60-62 and 67-68.

### **Engineering 81.511 Introductory Elasticity**

Concepts of stress, strain and displacement; plane elasticity, the Airy stress function, selected problems in plane elasticity; general theory of three-dimensional elasticity.

Lectures three hours a week, first term.

*Reference:* Timoshenko and Goodier, *Theory of Elasticity*.

*C. R. Thompson*

### **Engineering 81.512 Advanced Elasticity**

Selected topics from theory of beams, theory of torsion, complex variable methods, variational methods, classical three-dimensional problems, and thermoelasticity.

*Prerequisite:* Engineering 81.511 or consent of instructor.

Lectures three hours a week, second term.

*References:* To be selected by the instructor.

*C. R. Thompson*

### **Engineering 81.521 Theory of Plasticity**

Yield criteria and associated flow rules. Limit analysis. Applications to deformation, residual stress and fracture in bars, beams and tubes.

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Lectures three hours a week, second term.

*Reference:* Hill, *Mathematical Theory of Plasticity*.

*Not offered, 1969-70.*

### Engineering 81.522 Theory of Plates and Shells

Circular and rectangular plates with small deflections; introduction to large deflection theory of plates; membrane theory of shells; bending of shells of revolution and cylindrical shells.

Lectures three hours a week, first term.

*Reference:* Timoshenko and Woinowsky-Krieger, *Theory of Plates and Shells*.

*P. Janzen*

### Engineering 81.527 Experimental Stress Analysis

Photoelasticity: two-dimensional stress fields, models, types of polariscope, the shear difference method, relaxation solution of Laplace's equation, oblique incidence, isotropic points. Three-dimensional stress fields, frozen patterns, scattered light analysis. Formulae for photoelastic coating; photoelastic strain gauges. Gauge factors, loading effects on strain gauge bridges, balancing, cross and null balance sensitivity, calibration and temperature compensation. Models and analogues, soap film. Moire fringes, brittle lacquer, mechanical and optical strain gauges.

Lectures three hours a week, first term.

*References:* Frocht, *Photoelasticity*.

Dally and Riley, *Experimental Stress Analysis*.

Durelli and Riley, *Introduction to Photomechanics*.

*G. W. Bigg*

### Engineering 82.523 Theory of Structural Stability

General stability theory—discrete and continuous systems. The general eigenvalue problem. Introduction to the calculus of variations. Approximate methods. Topics from; beam columns; bars and frames; curved beams; thin-walled beams; plates and shells.

Lectures three hours a week, second term.

*Prerequisite:* Engineering 82.525 or equivalent.

*References:* Timoshenko and Gere, *Theory of Elastic Stability*.

Langhaar, *Energy Principles in Applied Mechanics*.

*G. W. Bigg*

### Engineering 82.525 Analysis of Elastic Structures

Use of the force method and the displacement method for the analysis of a variety of indeterminate structures including frames, arches and two- and three-dimensional trusses; matrix analysis of indeterminate structures; use of models; influence lines for indeterminate structures.

Lectures three hours a week, first term.

*Reference:* Hall and Woodhead, *Frame Analysis*.

*W. Wright*

### Engineering 82.526 Behaviour of Steel Structures

Bolted connections under static and dynamic load. Welded connections under static and dynamic load. Brittle fracture and its control. Ultimate strength of columns and beam-columns. Lateral and local buckling of members designed for plastic behaviour. Plastic behaviour of multi-storey frames subject to sidesway, behaviour of thin-webbed girders. Introduction to the behaviour of orthotropic plate structures.

Lectures three hours a week, second term.

*Reference:* McGuire, *Steel Structures*.

*W. Wright*

### **Engineering 82.527** Advanced Structural Design

Structural aesthetics; load analysis; earthquake resistant design; advanced concepts of design with examples; design project.

Lectures three hours a week, second term.

*References:* Nervi, *Structures*.

Blume, et al., *Design of Multistory Reinforced Concrete Building Frames for Earthquake Motions*.

*Not offered, 1969-70.*

### **Engineering 82.528** Advanced Reinforced Concrete

Ultimate strength and behaviour of reinforced concrete members. Current research and recent North American and European practice. Reinforced concrete members subjected to flexure, axial compression, combined flexure and axial load, combined flexure and shear; bond.

Lectures three hours a week, first term.

*R. F. Manuel*

### **Engineering 82.529** Prestressed Concrete

Influence of creep and shrinkage; analysis and design of tension members, pretensioned and post-tensioned beams; prestressing methods; friction losses, continuous beams.

Lectures three hours a week, first term.

*References:* Leonhardt, *Prestressed Concrete*.

Lin, *Prestressed Concrete Structures*.

Kani, *Prestressed Concrete*.

*G. T. Suter*

### **Engineering 83.528** Foundation Engineering — Case Histories

Study of selected case histories: limitations in methods of exploration, testing and design in foundation engineering. Site investigation: effects of absence of completeness. Bearing capacity and settlement: unsuitable foundations and superstructures, assessment of the effects of loads. Failures due to defective execution: dewatering, excavation, construction. External influences on foundation behaviour: groundwater, scour, slides, frost action, swelling of clays.

Lectures three hours a week, first term.

*References:* Terzaghi, *From Theory to Practice in Soil Mechanics*.

Selected papers.

*Not offered, 1969-70.*

### **Engineering 83.530** Advanced Soil Mechanics I

Clay mineralogy and physical chemistry of soils; effective stress, elastic equilibrium, pore pressure parameters; saturated and partially saturated soils; seepage, consolidation and settlement; shear strength.

Lectures three hours a week, first term.

*References:* Scott, *Principles of Soil Mechanics*.

Wu, *Soil Mechanics*.

*E. B. Fletcher*

## Engineering

### Engineering 83.531 Advanced Soil Mechanics II

Plasticity in soil mechanics, failure and yield criteria, plastic equilibrium, upper and lower bound solutions, statically admissible and kinematically admissible states, stability analysis for cohesive and cohesionless soils, bearing capacity, soil dynamics. Lectures three hours a week, second term.

*References:* Wu, *Soil Mechanics*.

Scott, *Principles of Soil Mechanics*.

E. B. Fletcher

### Engineering 83.532 Advanced Soil Mechanics III

Design of earth and rock-fill embankments, retaining structures, soil stabilization. Foundations including footings, rafts, piles, piers, caissons. Field instrumentation. Lectures three hours a week, second term.

*Reference:* Leonards, *Foundation Engineering*.

*Lecturer to be announced*

### Engineering 84.533 Pavement Design

Characterization of highway and airport traffic loads; stresses and load distribution in single and multi-layer flexible and rigid pavements; pavement behaviour under static, transient and repeated loads; interpretation and application of strength properties of subgrade soils and paving materials; theoretical and empirical design methods for flexible and rigid highway and airport pavements; pavement performance evaluation; pavement test roads; current research developments.

Lectures three hours a week, second term.

*References:* Yoder, *Principles of Pavement Design*.

Ann Arbor International Conference on Structural Design of Asphalt Pavements.

C.G.R.A. Guide to Structural Design of Flexible and Rigid Pavements in Canada.

D. A. Kasianchuk

### Engineering 84.534 Transportation Planning

A study of administrative and economic fundamentals including objectives of transportation planning, history of transportation, comparative transportation and transportation statistics, administration and finance, transportation economics and taxation, transportation in the regional planning framework.

Lectures three hours a week, first term.

*References:* Pegrum, *Transportation Economics and Public Policy*.

Currie, *Economics of Canadian Transportation*.

Kaplan, *The Regional City*.

A. M. Khan

### Engineering 84.535 Highway Traffic

Theory of traffic flow; volumes, speeds, interpretation of field data; characteristics of vehicles and road users; mathematical models and assignment techniques, freeway, arterial intersection and interchange design as related to operational performance; traffic control devices; design and operation of signal systems; parking studies; computer and operations research techniques.

Lectures three hours a week, first term.

*References:* Kennedy, et al., *Fundamentals of Traffic Engineering*.

Matson, et al., *Traffic Engineering*.

Highway Capacity Manual; Traffic Engineering Handbook.

A. M. Khan

**Engineering 84.536 Highway Materials**

Physical characteristics and strength evaluation of soils and aggregates in relation to highway engineering; frost action in soils; sources, manufacture and composition of bituminous materials; evaluation of properties and characteristics of bituminous materials; soils stabilization and granulometrics. Lectures will be supplemented by laboratory work.

Lectures three hours a week, first term.

*References:* Abraham, *Asphalts and Allied Substances*.

Traxler, *Asphalt—Its Composition, Properties and Uses*.

Road Research Laboratory, *Bituminous Materials in Road Construction*.

*D. A. Kasianchuk*

**Engineering 84.537 Urban Transportation**

Urban transportation studies and the techniques used in collecting, analyzing and summarizing the facts of the transportation problem. Topics to be discussed include: urban planning and land-use studies, origin-destination studies, trip characteristics, generation and distribution, traffic assignment, parking, mass transit, system planning and evaluation.

Lectures three hours a week, second term.

*References:* Martin, et al., *Principles and Techniques of Predicting Future Demand for Urban Area Transportation*.

Public Administration Service, *Development of Urban Transportation Plans*.

*C. D. Holmes*

**Engineering 84.538 Geometric Design**

A study of the geometric design standards for streets and highways. Highway classifications and capacity, design of roadway elements, geometric features of at-grade intersections, interchanges, and freeway ends are considered.

Lectures three hours a week, second term.

*References:* Glass, *Fundamentals of Geometric Design*.

Jones, *The Geometric Design of Modern Highways*.

CGRA Manual of Geometric Design Standards for Canadian Roads and Streets.

*Not offered, 1969-70.*

**Engineering 86.550 Physics of Semiconductor Materials and Devices**

Wave-particle duality. Waves in periodic structures. Schrodinger's equation. Band concepts. Thermostatistics of semiconductors, electrochemical potential and statistics of semiconductors. Steady state and dynamic carrier distributions, quasi-Fermi levels and recombination kinetics. Surface physics. MIS structure. Boltzmann transport theory. Current flow processes.

Lectures three hours a week, first term.

*Texts:* Nussbaum, *Semiconductor Device Physics*.

Grove, *Physics and Technology of Semiconductor Devices*.

*M. A. Copeland*

**Engineering 86.570 Structure of Materials**

The theory of diffraction of x-rays, electrons and neutrons by single crystals, polycrystals and liquids is developed. Methods of determining lattice parameters, crystal structures and crystal perfection are discussed.

Lectures three hours a week, first term.

*References:* James, *Optical Principles of X-Ray Diffraction*.

Gunier, *X-Ray Diffraction*.

*J. A. Goldak*



## Engineering

### Engineering 86.571 Properties of Materials

Cartesian Tensors, transformations, the representation quadratic, the effect of crystal symmetry, and the Mohr circle instruction; equilibrium properties including paramagnetic and diamagnetic susceptibility, electric polarization, the stress, strain, thermal strain, piezoelectricity and elasticity tensors; thermodynamics of equilibrium properties; transport properties—thermal and electrical conductivity; crystal optics including optical activity and birefringence.

Lectures three hours a week, second term.

*Text:* Nye, *Physical Properties of Crystals*.

*J. A. Goldak*

### Engineering 86.572 Deformation of Materials

Slip, twinning, kink bands and strain hardening in single crystals; yield point phenomena, strain ageing, strengthening mechanisms. Bauschinger effect and preferred orientation in polycrystalline aggregates; theories of fracture-delayed yielding, ductile fracture, notch effect, fracture curve, ductile-brittle transition, effect of hydrostatic pressure; theories of fatigue—size effect, surface effects, temperature dependence. Lectures three hours a week, first term.

*Text:* Dieter, *Mechanical Metallurgy*.

*M. J. Bibby*

### Engineering 86.573 Thermodynamics of Materials

A review of the first and second laws of thermodynamics, enthalpy, entropy, heat capacities of solids, thermoelastic effect, the third law of thermodynamics, free energy functions, Maxwell's equations, a statistical interpretation of entropy; thermodynamic activity and the equilibrium constant, solutions — ideal and non-ideal, phase relationships, chemical potential, solubility limits, the thermodynamics of binary systems; a short discussion of kinetics, activation energy.

Lectures three hours a week, second term.

*Text:* Swalin, *Thermodynamics of Solids*.

*M. J. Bibby*

### Engineering 88.506 Theory of Ground Vehicles

A study in depth of the mechanics of on-highway and off-highway vehicles. Wheeled and tracked vehicles; mechanics of running gears; interaction between running gears (wheels, tracks) and ground (pavement, terrains); motion resistance; traction; skid resistance; mechanics of a vehicle; equations of motion; steering; directional control; stability; vehicle vibrations; ground effect vehicles; air cushion generation; motion resistance; propulsion; stability and control; special purpose ground vehicles.

*References:* Bekker, *Theory of Land Locomotion*.

Bekker, *Off-the-Road Locomotion*.

*J. Y. Wong*

### Engineering 88.510 Principles of V-STOL Aircraft

Review of wing and propeller theory. High lift wings. Rotors in hover and in forward flight. Noise of propellers and rotors. Stresses. Weights. Operational requirements and economics.

*Prerequisite:* Engineering 89.506 or equivalent.

Lectures three hours a week, second term.

*Reference:* McCormick, *Aerodynamics of V-STOL Flight*.

*Not offered, 1969-70.*

**Engineering 88.512 Dynamics of Flight**

Development of the general equations of motion of the airplane and its control systems. Small disturbance theory. Representation of aerodynamic effects by means of stability derivatives. Longitudinal and lateral stability criteria. Longitudinal and lateral modes of airplane motion. Transient motions of the airplane in response to control movement. Automatic stability and control. Response to atmospheric turbulence.

Lectures three hours a week, second term.

*Prerequisite:* Engineering 88.437 or the equivalent.

*References:* Etkin, *Dynamics of Flight*.

Kolk, *Modern Flight Dynamics*.

D. G. Gould

**Engineering 88.513 Structural Dynamics and Aeroelasticity**

Review of string and beam vibrations. Vibrations of membranes and plates. Theory of normal modes and solution by normal mode expansions. Fourier transform methods. Matrix methods and finite element techniques. Vibration of built-up bodies, multi-bay panels, complete aircraft. Introduction to flutter, wing divergence, classical wing flutter, panel flutter.

Lectures three hours a week, first term.

*References:* Hurty and Rubenstein, *Dynamics of Structures*.

Biggs, *Structural Dynamics*.

Fung, *Theory of Aeroelasticity*.

M. D. Olson

**Engineering 88.517 Advanced Vibration Analysis**

Multi-degree of freedom systems; continuous systems, with selected topics from beams, frames, plates and shells, and disks; non-linear vibration; introduction to random vibrations.

Lectures three hours a week, first term.

*References:* Timoshenko and Young, *Vibration Problems in Engineering*.

Crandall and Mark, *Random Vibration in Mechanical Systems*.

Harris and Crede, *Shock and Vibration Handbook*.

Yu Chen, *Vibrations: Theoretical Methods*.

J. Kirkhope

**Engineering 88.530 Acoustics and Noise**

Fundamentals of vibrations of solids and fluids; plane waves, spherical waves. Transmission and reflection; acoustic impedance and matching. Resonators and filters. Absorption in fluids. Introduction to acoustic measurements; loudspeakers, microphones. Introduction to aero-acoustics and jet noise.

Lectures two hours a week, first term.

Laboratory and problem analysis three hours alternate weeks, first term.

*Text:* Kinsley, Frey, *Fundamentals of Acoustics*.

*References:* Beranck, *Acoustics*.

Beranck, *Noise Reduction*.

ASTM Standards, Thermal Insulation; Acoustical Materials; Fire tests; Building Construction, November 1966.

A. N. Abdelhamid

**Engineering 88.531 Aero-acoustics**

Acoustic wave motion; the wave equation and solutions; energy density and sound intensity, acoustic impedance, reflection, refraction and diffraction of sound waves.

## Engineering

Radiation of sound: simple source, periodic simple source; dipole and quadrupole source; examples. Source impedance, moving sources and Doppler effect. Acoustic transmission: ducts, tubes; standing waves. Lighthill's theory of jet noise spectra and directivity; jet noise suppressors; supersonic jet noise, sonic boom; noise from fans, compressors and propellers.

Lectures three hours a week, second term.

*Text:* Morse, Ingrade, *Theoretical Acoustics*.

*References:* Beranck, *Acoustics*.

Beranck, *Noise Reduction*.

*Not offered*, 1969-70.

### Engineering 88.547 Environmental Engineering

Thermal and humidity load analysis. Human comfort and tolerance. Environmental control methods: heating, refrigeration, humidification and drying; atmosphere and pollution control. System component characteristics; system analysis and design. Automatic controls.

Lectures three hours a week, first term.

*Prerequisite:* Engineering 90.546, or concurrent enrolment.

*Text:* Threlkeld, *Thermal Environmental Engineering*.

*Not offered*, 1969-70.

### Engineering 89.501 Theory of Viscous and Turbulent Flows

Fundamental concepts of viscous flow; derivation of Navier-Stokes equations; Prandtl's boundary layer approximation; momentum integral methods; incompressible and compressible laminar and turbulent boundary layers; stability; transition; turbulent flow; flow separation; transformation methods; shock wave-boundary layer interaction; semi-empirical solution of turbulent skin friction and heat-transfer problems. Lectures three hours a week, first term.

*Prerequisite:* Engineering 89.500 or equivalent.

*Reference:* Schlichting, *Boundary Layer Theory*.

A. N. Abdelhamid

### Engineering 89.502 Hypersonic Flow

One dimensional unsteady compressible flow. Hypersonic similarity; hypersonic small disturbance theory and applications; Newtonian flow; tangent-wedge and tangent-cone approximations; viscous interaction; real gas effects; vibrational relaxation; ideal dissociating gas including relaxation; experimental simulation of hypersonic flows. Lectures three hours a week, second term.

*Prerequisite:* Engineering 89.500 or equivalent.

*References:* Hayes and Probstein, *Hypersonic Flow Theory*.

Chernyi, *Introduction to Hypersonic Flow*.

*Not offered*, 1969-70.

### Engineering 89.503 Incompressible Nonviscous Flow

Derivation of the fundamental equations for inviscid incompressible and compressible flow; solution of two-dimensional potential flows by complex variable methods; axi-symmetric potential flows; vortex motion; low-speed airfoil theory; wing lifting-line theory.

Lectures three hours a week, first term.

*References:* Milne and Thompson, *Theoretical Hydrodynamics*.

Houghton and Brock, *Aerodynamics for Engineering Students*, CH. 10 to 13.

R. J. Kind

**Engineering 89.504 Compressible Nonviscous Flow**

One-dimensional isentropic, diabatic and frictional flow; normal and oblique shocks; reflection and interaction of oblique shocks. Equations for irrotational compressible flow; Gothert's rule and Prandtl-Glauert rule; expansion fans; method of characteristics; design of supersonic nozzle and diffuser contours; supersonic airfoil theory. Unsteady one-dimensional motion; small amplitude and finite amplitude isentropic waves; method of characteristics; shock tubes; guns and gun tunnels.

Lectures three hours a week, second term.

*References:* Shapiro, *Dynamics and Thermodynamics of Compressible Fluid Flow*. Liepmann and Roshko, *Elements of Gas Dynamics*.

*J. Ruptash*

**Engineering 89.506 Wing Theory (Subsonic Flow)**

Applications of basic equations of steady and unsteady, inviscid, compressible flow to problems of wings of finite span. Solutions of three-dimensional potential flow by method of singularities. Modified lifting-line and lifting surface theories with applications to rectangular and swept-back wings and to propellers. Acceleration potential method. Low aspect ratio theories with application to delta and rectangular wings.

Lectures three hours a week, first term.

*Prerequisites:* Engineering 89.503, 89.504.

*References:* Robinson and Lauriman, *Wing Theory*.

Donovan and Lawrence, *Aerodynamic Components of Aircraft at High Speeds*.

*P. Mandl*

**Engineering 89.507 Wing Theory (Supersonic Flow)**

Application of basic equations of steady and unsteady, inviscid, compressible flow to wings at supersonic speeds. Source distribution method, conical flow method and characteristic coordinates with applications to lifting and non-lifting surfaces of various plan forms. Selected topics from hypersonic and transonic flow theories.

Lectures three hours a week, second term.

*Prerequisites:* Engineering 89.503, 89.504.

*References:* Robinson and Lauriman, *Wing Theory*.

Donovan and Lawrence, *Aerodynamic Components of Aircraft at High Speeds*.

*P. Mandl*

**Engineering 89.508 Experimental Methods in Fluid Dynamics**

Principles of flow measurement and visualization. Optics and optical systems. Pressure, temperature and velocity measurement in high speed flows, and in boundary layers. Flow visualization methods, three dimensional and skewed boundary layers. Skin friction and heat transfer. Data recording, logging and analysis. Test facilities.

Lectures three hours a week, first term.

*References:* Landenburg, *Physical Measurements in Gas Dynamics and Combustion*, Vol. 9 Princeton.

Donovan, *Problems of High Speed Aircraft and Experimental Methods*, Vol. 8 Series. *Not offered*, 1969-70.

**Engineering 89.509 Advanced Topics in Fluid Dynamics**

Recent and advanced topics in fluid dynamics selected from recent publications. Students registered in the course are expected to present one or more lectures or seminars on assigned topics.

Lectures and seminars three hours a week, one term.



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*Prerequisites:* Engineering 89.503 and 89.504 or equivalent.

*R. J. Kind and J. Ruptash*

### Engineering 89.537 Groundwater and Seepage

Types and physical properties of aquifers, Darcy's law; hydraulic conductivity of isotropic, anisotropic, and multi-layered soils; uniform flow, unidirectional flow, steady and unsteady; Boltzman's transformation; radial flow, steady and unsteady; flow nets for various boundary conditions; method of images; partially penetrating wells; leaky aquifers; sea water intrusion, Ghyben-Herzberg relation between fresh and saline water, shape of interface; hydromechanics of unsaturated fluids in porous media. Lectures three hours a week, first term.

*References:* Harr, *Groundwater and Seepage*.

DeWiest, *Geohydrology*.

Scheidegger, *The Physics of Flow Through Porous Media*.

Todd, *Ground-Water Hydrology*.

*Not offered, 1969-70.*

### Engineering 89.541 Turbomachinery

Non-dimensional parameters and similarity. Energy and torque relations for rotating coordinate systems. Radial equilibrium equations. Cascades: flow; performance and testing. Axial flow turbomachines: energy relations, flow patterns, types, characteristics and design. Radial flow turbomachines: energy relations, flow patterns, types, characteristics and design. Viscous flow and boundary layer effects, skewed boundary layers and cross flows, secondary flows. Compressor surge and rotating stall. Lectures three hours a week, second term.

*References:* Shepherd, *Principles of Turbomachinery*.

NASA SP 36, *Aerodynamic Design of Axial Flow Compressors*.

Horlock, *Axial Flow Compressors*.

Horlock, *Axial Flow Turbines*.

*D. A. J. Millar*

### Engineering 90.542 Gas Turbines

Design-point cycle calculation. Analysis of fundamental components—compressors, combustors, turbines, nozzles, mixers, afterburners, heat exchangers, etc. Cycle characteristics of turbojet, turbofan, turboprop, turboshaft, etc., engines. Off-design performance calculation performance parameters; Reynolds number effects; component maps; theorems of equilibrium operation. Differential analysis techniques. Control concepts. Calculation and simulation of transient response. Lectures three hours a week, first term.

*References:* Hodge, *Gas Turbines, Cycles and Performance Estimation*.

Zucrow, *Gas Turbines and Jet Propulsion Engines, Aircraft and Missile Propulsion*, Volume 2.

Sawyer, *Gas Turbine Engineering Handbook*.

*E. P. Cockshutt*

### Engineering 90.543 Classical Thermodynamics

Equilibrium; first law, second law, state principle, and zeroth law; criteria of equilibrium, temperature, entropy and availability; Maxwell relations; open systems; phase rule; systems of one and two components; idealized gases; mixtures and solutions; equations of state; thermodynamics potentials; chemical reactions and chemical equilibrium. Lectures three hours a week, first term.

*Text:* Hatsopoulos and Keenan, *Principles of General Thermodynamics*.

*E. G. Plett*



**Engineering 90.544 Statistical Thermodynamics**

Microscopic structure of substances. Kinetic theory. Maxwell, Bose-Einstein & Fermi-Dirac Statistics. Entropy, probability, equilibrium.

Lectures three hours a week, second term.

*References:* Lee, Sears and Turcotte, *Statistical Thermodynamics*.

Sonntag and Van Wylen, *Fundamentals of Statistical Thermodynamics*.

*Not offered, 1969-70.*

**Engineering 90.545 Advanced General Thermodynamics**

Stable equilibrium; normal and special systems alternative criteria of equilibrium; solutions and electrolytes; gravity and electromagnetic fields; ionized gases. Thermodynamics of irreversible processes; Onsager reciprocal relations; diffusion; electronic phenomena in solids, vacua and plasmas. Special topics.

*Text:* Hatsopoulos and Keenan, *Principles of General Thermodynamics*.

*Prerequisite:* Engineering 90.543.

*Not offered, 1969-70.*

**Engineering 90.547 Conductive Heat Transfer**

Conductive heat transfer in both steady and transient states. General heat conduction equation, laws of similitude, electrical analogy. Steady one- and multi-dimensional solutions, including internal heat generation. Transient conduction, both steady and unsteady boundary conditions. Analytical, numerical, conformal mapping methods are covered, as well as digital and analogue computer applications.

Lectures plus seminars three hours a week, first term.

*References:* Schneider, *Conduction Heat Transfer*.

Arpaci, *Conduction Heat Transfer*.

R. C. Biggs

**Engineering 90.548 Convective Heat and Mass Transfer**

Review of analogies between heat, mass and momentum transfer. Free and forced convection from theoretical and experimental viewpoint for laminar and turbulent flows in ducts and over flat plates and blunt bodies. Heat transfer-friction relationship in heat exchangers. Film and dropwise condensation. Boiling with forced and natural convection. Two-phase flow. Mass transfer in stationary, laminar and turbulent flow systems.

Lectures three hours a week, second term.

*Text:* Rohsenow and Choi, *Heat, Mass and Momentum Transfer*.

E. G. Plett

**Engineering 90.549 Radiative Heat Transfer**

Introduction to radiation, surface radiation, radiation interchange with athermanous media, radiation properties, total, monochromatic, directional; property measurement. Surface radiative interchange, black, gray, non-gray, non-diffuse surfaces; angle factors and evaluation. Radiative interchange with athermanous media, radiative equilibrium, combined conductive and radiative, combined convective and radiative interchange.

Lectures and seminars three hours a week, second term.

*References:* Sparrow and Cess, *Radiation Heat Transfer*.

Love, *Radiative Heat Transfer*.

Wiebelt, *Engineering Radiation Heat Transfer*.

R. C. Biggs

## Engineering

### Engineering 93.556 Passive and Active Network Theory

Passive 1-port networks; positive real property; reactance functions; synthesis of passive driving-point functions. Passive and active 2-ports: driving point and transfer functions; voltage, current and power gains; stability. Passive filter synthesis. Gain and stability of active two-ports. Conjugate matching and mismatching. Unilateralization. Network invariants. Introduction to synthesis of active transfer functions.

Lectures three hours a week, first term.

*Text:* Ghausi, *Principles and Design of Linear Active Circuits*.

A. R. Boothroyd

### Engineering 93.586 Computer Aided Circuit Design

The course will be concerned with the application of computer methods in circuit analysis and design. Topics will include matrix analysis, topological methods, state space techniques, numerical analysis, modelling of solid state devices, optimization techniques. DC, transient and AC small and large signal analysis of linear and nonlinear circuits will be treated.

Lectures three hours a week, second term.

*References:* Calahan, *Computer-Aided Network Design*.

*Not offered, 1969-70.*

### Engineering 94.545 Nonlinear and Adaptive Systems

Examples of nonlinear electrical and mechanical systems. Nonlinear phenomena. Phase plane representation: trajectories, singular points, limit cycles. Relay-operated systems; optimum switching; dual mode control. The Describing Function; compensation in the frequency domain; forced response. Liapunov functions. Introduction to adaptive control; model reference systems; discrete state systems.

Lectures three hours a week, second term.

*Text:* Gibson, *Nonlinear Automatic Control*.

J. S. Riordon

### Engineering 94.552 Advanced Linear Systems

Mathematical techniques used in the analysis of linear systems. Review of analysis by transform methods using the Fourier transform. General relationship between time and frequency functions. Band-pass/low pass transformations. Causal functions and the Hilbert transform. The sampling Theorem and general orthonormal expansions. Analysis of linear time-invariant and time-varying systems using State-space methods. Controllable and observable systems. Discrete time linear systems.

Lectures three hours a week, first term.

*References:* Papoulis, *The Fourier Integral and its Applications*.

De Russo, Roy and Close, *State Variables for Engineers*.

B. Pagurek

### Engineering 94.553 Stochastic Processes

An introduction to the description of random signals: representation, power measurement, correlation, spectral analysis, linear systems. Probability theory: basic concepts, discrete random variables, distributions; continuous random variables, distribution functions; averages, moments, characteristic functions. Mean square estimation, principle of orthogonality. Random processes: time averages, correlation functions, Gaussian processes. Wiener-Kolmogorov theory, casual Wiener filter, Wiewer-Hopf equation. Examples. Multivariate Gaussian density in matrix form.

Lectures three hours a week, first term.

*References:* Beckmann, *Probability in Communication Engineering*.

Papoulis, *Probability, Random Variables, and Stochastic Processes*.  
 Lee, *Statistical Theory of Communications*.  
 Sakrison, *Communication Theory*.  
 A. R. Kaye

#### **Engineering 94.554 Statistical Communication Theory and Information Theory**

Introduction to the philosophy of communications. Signal-to-noise ratio in linear and non-linear demodulators. Waveform representation; the sampling theorem, sampled signals and sample statistics. Statistical decision theory: hypothesis testing, parameter estimation. Optimum receiver principles: vector signals and the additive noise channel. An introduction to information theory: concepts and definitions, source coding and coding for noisy channels. Radar signals and ambiguity functions.

*Prerequisite:* Engineering 94.553.

Lectures three hours a week, second term.

*References:* Harman, *Principles of the Statistical Theory of Communications*.  
 Sakrison, *Communication Theory: Transmission of Waveforms and Digital Information*.

Schwartz, Bennett and Stein, *Communication Systems and Techniques*.

Abramson, *Information Theory and Coding*.

D. C. Coll

#### **Engineering 94.555 Digital Control Systems**

Fundamentals of linear sampled-data control systems. The  $z$  transform. Frequency response of sampled systems. Stability and realizability of digital pulse filters. State variable methods. Design of digital compensators in the frequency domain and in the  $z$  plane. Minimum settling time systems. Synthesis of optimal linear feedback systems using dynamic programming.

Lectures three hours a week, first term.

*Text:* Lindorff, *Theory of Sampled-Data Control Systems*.

J. S. Riordon

#### **Engineering 94.556 Advanced Stochastic Processes**

Definition of a stochastic process. Wiener process, Levy's theorem, their relation to white and broadband noise. Poisson process. Processes with independent increments, processes with uncorrelated or orthogonal increments. Markov processes, Chapman-Kolmogoroff equation, Fokker-Planck equations. Modelling physical processes. The stochastic integral and diffusion equations. Least square estimators; Wiener-Karman filter, linear smoothing filter, selected nonlinear estimation problems in communication and control.

*Prerequisite:* Engineering 94.553.

Lectures three hours a week, first term.

*References:* Papoulis, *Probability, Random Variables and Stochastic Processes*.

Doob, *Stochastic Processes*.

Current IEEE Transactions.

*Not offered, 1969-70.*

#### **Engineering 94.564, Analog Communications Systems**

Common analog modulation-demodulation schemes: AM, DSB, SSB, PM, FM. The phase lock loop, (PLO), Fokker-Planck equation and cycle skipping. Optimum demodulation of analog signals. Digital communication of analog data. Pulse amplitude modulation, intersymbol interference. State space techniques and non-linear estimation problems.

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*Prerequisite:* Engineering 94.556.

Lectures three hours a week, second term.

*References:* IEEE Transactions on Information Theory, Control Theory and Communication Technology.

Viterbi, *Principles of Coherent Communication*.

S. T. Nichols

### Engineering 94.565 Digital Communications and Coding Theory

Introduction to digital communications. The philosophy of PCM: quantization, coding, and transmission. Probability of error for different message set and optimal receivers, block orthogonal coding. Random coding theory: binary channels, general discrete memoryless channels. Fundamentals of modern algebra. Algebraic coding. Threshold decoding. Sequential decoding.

Lectures three hours a week, first term.

*References:* Wozencraft and Jacobs, *Principles of Communication Engineering*.

Peterson, *Error Correcting Codes*.

D. A. Wright

### Engineering 94.566 Advanced Topics in Control Systems

A course dealing with recent and advanced topics in the field of control systems and related areas. Primary references are recent publications in the field. Students registered in the course are expected to present one or more lectures or seminars on assigned topics.

*Prerequisite:* Engineering 94.585.

Lectures and seminars three hours a week, one term.

B. Pagurek and J. S. Riordon

### Engineering 94.570 Introduction to Bio-Engineering

Structure and function of various living organs; properties of nerve and muscle, neuro-muscular systems, models of system function. Basic research techniques to explore living systems functions. Development of research results into diagnostic and therapeutic tools. Laboratory work and demonstrations are integrated with the lecture series and emphasise electrical manifestations of activity.

Lectures and laboratory three hours a week, first term.

*References:* To be supplied.

M. Milner

### Engineering 94.584 Advanced Topics in Communication Systems

A course dealing with recent and advanced topics in the field of communication systems and related areas. Primary references are recent publications in the field. Students registered in the course are expected to present one or more lectures or seminars on assigned topics.

*Prerequisite:* Engineering 94.565.

Lectures and seminars three hours a week, one term.

D. A. George and S. T. Nichols

### Engineering 94.585 Time-Varying and Optimal Control Systems

State-space methods applied to time-invariant and time-varying systems. The calculus of variations. The Maximum Principle of Pontryagin. On-off systems. Dynamic programming. Iterative optimization techniques. The Kalman filter and the Duality Principle.

*Prerequisite:* Engineering 94.552.



Lectures three hours a week, second term.

*References:* Sage, *Optimum Control Systems*.

De Russo, Roy and Close, *State Variables for Engineers*.

Athans and Falb, *Optimal Control*.

B. Pagurek

### **Engineering 95.557** Topics in Switching Theory

Modern algebra; groups, cosets, rings and ideals, fields, vector spaces. Finite state machines; state diagrams, distinguishable and equivalent states, reduced machines, partially specified machines, Moore and Mealy machines. Synchronising sequences, homing sequences, (present and adaptive), machine identification, regular expressions, lossless machines. Linear sequential circuits; synthesis from characterizing matrices, general response formula, autonomous and quiescent LSC's, LSC applications. Shift registers; sequences, linear and non-linear theory. Hazard detection, circuit delays, synchronization techniques. Computer techniques; bus structures, adders with skip carry logic, adders with and without carry, register operations.

Lectures three hours a week, second term.

*References:* Henne, *Finite State Models for Logical Machines*.

Gill, *Linear Sequential Circuits*.

Golomb, *Shift Register Sequences*.

S. Tavares

### **Engineering 95.560** Advanced Engineering Application of Digital Computers

Finite difference methods, polynomial interpolation and curve fitting. Undetermined coefficients used for interpolation and integration. Integration in general. Errors using Peano's Kernel. Differential equations; predictor-corrector methods, truncation error, convergence and stability. Fourier methods; discrete Fourier transform, fast Fourier transform. Matrices, LU decomposition, scaling.

The second term offering of this course differs from the first. Fourier methods are omitted and the numerical solution of partial differential equations of the elliptic, parabolic and hyperbolic types are discussed.

*Text:* Hamming, *Numerical Methods for Scientists and Engineers*.

*References:* Lanezos, *Applied Analysis*.

Davis and Rabinowitz, *Numerical Integration*.

Salvadori and Baron, *Numerical Methods in Engineering*.

J. Y. Wong and J. P. Knight

### **Engineering 96.558** Topics in Semiconductor Devices

The course is concerned with the internal electronic theory, performance limitations, characterization and aspects of design of bipolar and field-effect transistors, integrated circuits and special purpose semiconductor devices. Selected topics are presented and the course content will vary from year to year.

*Prerequisite:* Engineering 96.580 or equivalent.

Lectures three hours a week, second term.

*References:* Thornton, et al, *Characteristics and Limitations of Transistors*, SEEC, Vol. 4.

Warren and Fordenwalt, *Integrated Circuits Design Principles and Fabrication*.

Wallmark and Johnson, *Field-Effect Transistors*.

R. E. Thomas

### **Engineering 96.559** Solid State Device Fabrication Technology

Processes of fabrication used in silicon planar and thin film technology. Vapour phase growth, thermal oxidation, solid state diffusion, vacuum processes. Photolithography. Characterization and limitations of processes. Design considerations for



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discrete devices and integrated circuits. Methods of material, process and device assessment. Recent and speculative developments in fabrication technology. The course will include laboratory demonstrations.

Lectures three hours a week, first term.

*References:* Warner and Fordemwalt, Eds., *Integrated Circuits (Motorola)*.

Grove, *Physics and Technology of Semiconductor Devices*.

R. E. Thomas

### Engineering 96.561 Quantum Fundamentals of Electronics

Principles of quantum theory. Solids and gases. Magnetic effects. Transition probabilities; thermionic, field, photo and secondary emission. Tunneling. Conduction theory. Thermoelectric and thermomagnetic effects. Photon induced transitions; electromagnetic interactions. Photodiodes and photo-emitting diodes. Solid state and gas lasers.

Lectures three hours a week, second term.

*References:* Lindsay, *Introduction to Quantum Mechanics for Electrical Engineers*.

Levine, *Quantum Physics of Electronics*.

Selected papers.

G. D. Cormack

### Engineering 96.580, Theory of Semiconductor Devices

Review of solid state physics underlying device mechanisms. Equilibrium and non-equilibrium conditions in a semiconductor. Physical theory of basic semiconductor device structures and aspects of design. Charge control theory. Modelling of device mechanisms. Large and small signal models of transistors and their relation to device performance.

Lectures three hours a week, first term.

*References:* Adler et al, *Introduction to Semiconductor Physics* SEEC I.

Gray et al, *Physical Electronics and Circuit Models of Transistors* SEEC II.

Jonscher, *Principles of Semiconductor Device Operation*.

A. R. Boothroyd

### Engineering 96.588 Theory of Non-linear Circuits and Devices

Solid state devices as non-linear circuit elements. Techniques of analysis: energy methods, Manley-Rowe power relations, phase plane, graphical methods, piecewise linearization, variation of parameters, perturbation methods, harmonic balance. Volterra series. Van der Pol, Rayleigh and Duffing equations, equations with time-varying coefficients. Typical applications: non-linear distortion, frequency multiplication, oscillation ("negative resistance" and "parametric" types), synchronization. Transducers as well as non-linear capacitive, resistive and inductive circuits will be studied, with emphasis on equivalent circuit modelling.

Lectures three hours a week, second term.

*References:* Cunningham, *An Introduction to Non-Linear Analysis*.

Tacker, *Circuits with Periodically-varying Parameters*.

M. A. Copeland

### Engineering 97.515 Introduction to Plasma Dynamics

Basic theory of electrically conductive gases. Motion of non-interacting charged particles in electromagnetic fields. Effects of collisions on motion, scattering and collision physics, Boltzmann transport theory, diffusion equations and relation of electrical conductivity to particle motions, Debye shielding, Alfven waves. Non-neutral plasmas such as exist in sheathes and electrofluiddynamic devices. Collision dominated plasmas — the magnetofluiddynamic equations.

Lectures three hours a week, first term.

*Reference: Holt and Haskell, Foundations of Plasma Dynamics.*  
*G. D. Cormack*

### **Engineering 97.516** Magnetoplasmodynamics

Heat and current flow in collision-dominated moving plasmas. Application of theory to analysis of MPD generators, plasma accelerators, MPD waves, high velocity shock waves, MPD shock waves, and sheathes. Production of plasmas, diagnostics of plasmas, current research.

Lectures three hours a week, second term.

*References: Rose and Clarke, Plasmas and Controlled Fusion.*

*Holt and Haskell, Foundations of Plasma Dynamics.*

*Not offered, 1969-70.*

### **Engineering 97.551** Applied Electromagnetic Theory

Solutions of Maxwell's equations for representative electromagnetic problems involving conduction in materials and free space. Topics include atomistic model of permittivity, permeability and conductivity; anisotropic behaviour of semiconductors, ferrites and plasmas; complex constitutive parameters. Electromagnetic wave theory: transmission through various media and interfaces, examples of guided waves, resonant cavities, microwave network analysis. Radiation theory: dipoles, arrays and aperture antennas. Interferometry and holography.

Lectures three hours a week, first term.

*Reference: Ramo, Whinnery and Van Duzer, Fields and Waves in Communication Electronics.*

*W. Makios*

### **Engineering 97.562** Microwave Solid State Electronics

Microwave circuit theory. Strip line circuits, filters, couplers, isolators, circulators. Mixers. Parametric amplifiers and converters. Multipliers. Schottky barrier diodes, varactor and snap-off diodes. Ferrite devices. Bulk negative resistance effects in semiconductors; avalanche diode transit time oscillator, Gunn effect oscillators. Microwave transistors. Microwave integrated circuits. Millimeter wave techniques. Lectures three hours a week, second term.

*References: Ishii, Microwave Engineering.*

*Blackwell and Kotzebue, Semiconductor Parametric Amplifiers.*

*Louisell, Coupled Mode and Parametric Electronics.*

*W. Makios*

### **Engineering 97.581** Electromagnetic Waves

Guided waves: perturbational and variational techniques applied to waveguides and cavities, obstacles and irises in waveguides, scattering and transmission matrix representations for obstacles, properties of lossy and periodically loaded transmission lines. Radiation: evanescent and radiative fields, radiation patterns of phase controlled arrays and other antenna configurations, radio astronomy antennas. Dispersion of signals by atmospheric and ionospheric conditions.

Lectures three hours a week, second term.

*References: Jones, The Theory of Electromagnetism.*

*Papas, Theory of Electromagnetic Wave Propagation.*

*Harrington, Time-Harmonic Electromagnetic Fields.*

*E. V. Jull*

### **Engineering 99.596** Directed Studies

### **Engineering 99.599** M.Eng. Thesis

### **Engineering 99.699** Ph.D. Thesis



# English Language and Literature

Professors	Munro Beattie, G. B. Johnston, Marston LaFrance (on leave of absence, 1969-70), R. L. McDougall, G. J. Wood
Visiting Professor	A. W. Trueman
Associate Professor; Chairman of the Department	B. W. Jones
Associate Professors	V. K. Chari, T. H. Coulson, James Downey, Maureen Gunn, Charles Haines, T. J. Henighan (on leave of absence, 1969-70), Alan D. McLay, James Steele, A. T. Tolley, Douglas Wurtele, Lorna D. Young
Assistant Professors	Elizabeth Barrett, D. A. Beecher, M. I. Cameron, W. Patrick Dunn, Barbara Garner, John J. Healy, A. W. Heidemann, Robert L. Hogg, Robert Laird, Christopher Levenson, Robert B. Lovejoy, R. H. MacDonald, Robin D. Mathews, George McKnight, Thomas J. Middlebro' (on leave of absence, 1969-70), Kathleen O'Donnell (St. Patrick's College), Ian Pringle, R. I. Stephens-Jones, Alistair Tilson, James Wilcox
Sessional Lecturers	William Couch, Thomas Farley, Pauline Hemming, Lorna Irving, J. I. Jackson, Lorna MacLean, Duane MacMillan, Michael Thompson, Sonia Tilson, Eva Whitaker, Mary L. Wilson, Anna Wurtele
Teaching Fellows	Margaret Hamer, Hans Kouwenberg, Susan Wood

## Major in English

Every student who elects English as a major subject will plan his program in consultation with a member of the department. The major in English consists of a minimum of six courses in English, as follows:

- a first year course in English, preferably English 18.162;
- English 18.232 in the second year, and 18.352 in the third year;
- three other courses in English.

With the approval of the department, a student may arrange in special cases a course program which would allow alternatives to 18.232 and to 18.352.

In order to continue in the major or honours program, a student must attain a grade-point average of 4.0 or better in the first year course in English. A grade-point average of at least 4.0 must be maintained thereafter in English courses.

A combined major in English and another subject will include at least five courses in English. 18.232 and 18.352 (or in special cases approved alternatives) are required. Both departments must be consulted in planning a combined program.

## Honours in English

All students who meet the general university honours requirements, and who have at least second class standing in English, will be admitted to, and permitted to continue in the Honours program. Students with third class standing in English will be given individual consideration on application to the departmental honours advisory committee.

An honours student will plan his program in consultation with a member of the department's honours advisory committee. Honours students should become

familiar with the General Regulations for Honours Degrees (p. 13). The honours program consists of eleven courses in English, to include the following:

- a) a first year course in English, preferably 18.162;
- b) 18.205 or 18.212, and 18.232 in the second year;
- c) 18.300 and 18.352, in the third year, and 18.436 in the third or fourth year;
- d) 18.499 for two credits in the final year.

The remaining courses in English are to be chosen in consultation with a member of the honours advisory committee.

The department recommends that English 13.309 (also listed as Classical Civilization 13.309) be taken in the second year. This will be counted as one of the eleven courses required for the honours degree.

With the approval of the honours advisory committee, a student may arrange in special cases a course program which allows alternatives to 18.232 and 18.352.

Courses in Comparative Literature approved by the advisory committee may be counted towards the honours degree in English.

Combined honours programs may be taken with French, German, History, Philosophy, Sociology, and with other departments by arrangement. Eight courses in English are usually required, including 1) 18.205, 18.212 or 18.322; 2) 18.232 (or approved alternatives); 3) 18.352 (or approved alternatives); 4) 18.436; 5) 18.499 (or an approved equivalent in the other department).

For information regarding preparation for admission to the Ontario College of Education for the Interim High School Assistant's Certificate, Type A, students are invited to consult the Registrar. Students who look forward to high-school teaching as a career are urged to consider the advisability of taking an honours degree.

### Graduate Studies

The Department of English offers programs of studies leading to the degree of Master of Arts in English Language and Literature. Such programs are planned with regard both to each candidate's special requirements and to the library facilities available. (See also p. 67).

An applicant for admission to graduate study in English must have completed the requirements of an Honours B.A. degree in English Language and Literature, or have similar qualifications, to qualify for a one-year M.A. program. Specifically, this requirement means that an applicant must have completed five courses beyond the Pass B.A. degree and attained at least Second Class standing in examinations as an undergraduate, at the honours level, in at least *five* of the following areas of English Language and Literature:

History of the English Language *or* General English Linguistics

Old English *or* Middle English

Renaissance Literature

Drama, including Shakespeare

Restoration and Eighteenth-Century Literature

Romantic and Nineteenth-Century Literature

Twentieth-Century Literature

Canadian *or* American Literature

Applicants whose Honours B.A. degree does not include examination in Old English, *or* Middle English, *or* History of the English Language must either take the honours course in *one* of these subjects or write the honours examination in it, obtaining Second Class standing, in addition to completing the required graduate courses.

Applicants who hold a General or Pass B.A. degree of Second Class standing or higher, with a major in English Language and Literature, may be admitted. They



will be required to complete a qualifying year program (normally four or five courses in English as determined by the Department of English), and maintain at least Second Class standing in each of their qualifying courses, before proceeding to the M.A. program.

Applicants must have a reading knowledge of one language other than English acceptable to the Department (e.g., French, German, Latin, Greek; given special circumstances, other languages may be acceptable).

A candidate for the M.A. degree in English Language and Literature must obtain at least Second Class standing in each of three graduate courses, submit an acceptable thesis, and pass a final oral examination based upon his completed thesis and course work.

For further details, consult the departmental supervisor of graduate students.

### **English 18.010 Literature and Composition**

The course is based on the study of selected plays, poems, short stories, essays, and novels. Essay-writing is required.

*Day Division:* Annually (three hours a week).

*M. I. Cameron (co-ordinator), Pauline Hemming, M. Thompson, Eva Whitaker*

*Evening Division:* Annually (three hours a week).

*Mary L. Wilson*

*Summer: 1969 Evening Division* (five hours a week).

*W. Couch*

### **English 18.100 English Authors from Chaucer to T.S. Eliot**

A study of significant works of English literature, presented as a general historical survey from the fourteenth to the twentieth century. Essay-writing will be required.

*Prerequisite:* English 18.010 or equivalent.

*Day Division:* Annually (three hours a week).

*Douglas Wurtele (co-ordinator), Maureen Gunn, R. Laird, I. Pringle, J. Steele, Sonia Tilson*

*Evening Division:* 1969-70 (four hours a week).

*T. Farley*

*Summer: 1969 Evening Division* (five hours a week).

*M. Thompson*

*Summer: 1969 Day Division* (ten hours a week).

*Sonia Tilson*

### **English 18.101 English and Continental Texts: Dante to T.S. Eliot**

A study of works by English and Continental writers, including Dante, Boccaccio, Chaucer, Shakespeare, Byron, Flaubert, Tolstoi, Ibsen, O'Casey, Pirandello, T. S. Eliot and Dylan Thomas. The continental texts will be read in translation.

*Prerequisite:* English 18.010 or equivalent.

*Day Division:* Annually (lectures two hours a week, group discussion one hour a week).

*C. Haines and assistants*

### **English 18.102 Form and Tradition**

A study of the dominant literary forms of the present day: the novel, short story, essay, poetry, and the drama. The course attempts to develop both an awareness of form and a perspective of values by comparing significant modern works with traditional works in each genre. Essay-writing will be required and special attention will be given to a topic of contemporary significance.

## English Language and Literature

*Prerequisite:* English 18.010 or equivalent.

*Day Division:* Annually (three hours a week).

*W. P. Dunn (co-ordinator), D. A. Beecher, V. K. Chari, J. Healy, R. Lovejoy, G. McKnight, Lorna Young*

*Summer: 1969 Day Division* (ten hours a week).

*D. MacMillan*

### English 18.115

A study of selected examples of literary genres from classical antiquity to the twentieth century. Open to students reading for an Engineering degree. This course may serve, at the discretion of the English Department, as a prerequisite to advanced courses in English.

*Day Division:* Annually (lectures two hours a week, discussion group one hour a week).

*J. M. Wilcox (co-ordinator), A. W. Heidemann, R. I. Stephens-Jones*

### English 18.162 Twentieth-Century Literature

For major and honours students only, in the first year. An introduction to literary study, examining the poetry and fiction of the twentieth century. The relation between critical ideas and literary works will be emphasized. The course will consider the following: short fiction, the work of Conrad and Lawrence, a selection of novels and a selection of poems.

*Day Division:* Annually (four hours a week, including a one-hour seminar).

*R. H. MacDonald (co-ordinator), Elizabeth Barrett, R. L. Hogg, C. Levenson*

*Evening Division: 1969-70* (four hours a week).

*Lorna Irving*

*Summer: 1969 Day Division* (ten hours a week).

*C. Levenson*

*Summer: 1969 Evening Division* (five hours a week).

*Lorna MacLean*

### English 18.205 History of the Language

A course on the nature and development of the sounds, grammar and spelling of the English language, together with some study of its cultural and stylistic evolution. The course may serve as an alternative to English 18.212 (Old English) for honours students.

*Prerequisite:* a first-year course in English.

*Day Division: 1969-70* (three hours a week).

*I. Pringle and R. Lovejoy*

### English 18.212 Old English

A study of Old English language and literature, including grammar and phonology, and translation of selections of Old English prose and poetry.

*Prerequisite:* a first-year course in English.

*Day Division:* Annually (two hours a week).

*G. B. Johnston*

### English 18.232 English Studies I

The required course for second year honours and major students. A selected group of major authors from Chaucer to Pope will be studied intensively, and their intellectual and artistic relationships emphasized: in 1969-70, Chaucer, Marlowe, Donne, Jonson, Milton, Swift and Pope.

*Prerequisite:* a first-year course in English.

*Day Division:* 1969-70 (three hours a week, lectures and seminar).

*R. I. Stephens-Jones (co-ordinator), M. I. Cameron, Barbara Garner, A. D. McLay, J. Steele*

*Evening Division:* 1969-70 (three hours a week).

*A. Tilson*

*Summer:* 1969 *Day Division* (ten hours a week).

*R. Lovejoy*

*Summer:* 1969 *Evening Division* (five hours a week).

*Anna Wurtele*

### **English 18.234** Drama in England until 1642

Study of the development of dramatic production and literature from the middle ages to the closing of the theatres in 1642. Reading of representative plays, excluding Shakespeare.

*Prerequisite:* a first-year course in English.

*Day Division:* 1969-70 (two hours a week).

*D. A. Beecher*

*Summer:* 1969 *Day Division* (ten hours a week).

*D. A. Beecher*

### **English 18.236** Shakespeare

Study of Shakespeare's environment and development as a dramatist, with reading of a select group of plays.

*Prerequisite:* a first-year course in English.

*Day Division:* 1969-70 (two hours a week).

*A. W. Trueman*

*Evening Division:* 1969-70 (two hours a week).

*Anna Wurtele*

### **English 18.298** Writing Seminar

A non-credit seminar in writing, involving regular assignments in various genres, and practical criticism based on this work. Time to be arranged. Enrolment will be limited. Complete details may be obtained at the time of registration.

*J. I. Jackson*

### **English 18.300** Literary Criticism from Aristotle to the Present

*Text:* W. J. Bate, *Criticism: The Major Texts*.

*Prerequisite:* honours students; others by permission.

*Day Division:* Annually (three hours a week, lectures and seminar).

*A. Tilson*

*Summer:* 1969 *Evening Division* (five hours a week).

*A. Tilson*

### **English 18.303** The English Novel

The development of the art of fiction in English literature, from its beginning in the eighteenth century, through the major Victorian novelists, to the beginning of the twentieth century.

*Prerequisite:* a first-year course in English or permission.

*Day Division:* 1969-70 (two hours a week).

*J. M. Wilcox*

**English 18.304** A Survey of Drama

The development of dramatic traditions and themes from the classical to the contemporary theatre, with particular emphasis on English and American drama.

*Prerequisite:* a first-year course in English.

*Day Division:* 1969-70 (two hours a week).

*G. J. Wood*

*Evening Division:* 1969-70 (two hours a week).

*G. J. Wood*

**English 13.309** Greek and Latin Literary Genres

A study through English translations of the various genres of Greek and Latin literature, especially those which influenced later European writing: epic, drama, the ode, pastoral poetry, satire. (Offered in the Department of Classics as *Classical Civilization 13.309*.)

*Day Division:* 1969-70 (two hours a week).

*D. G. Beer*

**English 18.322** Middle English

A study of the English language and literature between the Norman Conquest and the fifteenth century. Special attention is given to fourteenth-century literature.

*Prerequisite:* permission of the instructor.

*Day Division:* 1969-70 (three hours a week).

*Maureen Gunn*

**English 18.327** Chaucer and the Allegorical Tradition

A study of the works of Chaucer and Spenser, principally *The Canterbury Tales* and *The Faerie Queene*, together with contemporary background and current critical writings.

*Prerequisite:* English 18.232 or permission of the instructor.

*Day Division:* 1969-70 (three hours a week).

*D. Wurtele*

**English 18.336** Milton

An intensive study of the poetry and prose of Milton, combined with an examination of the intellectual background of his work and his age.

*Prerequisite:* honours standing or permission of the instructor.

*Not offered, 1969-70.*

**English 18.338** Studies in the Renaissance

An intensive study of several Renaissance genres. In 1969-70 the love sonnet, lyric poetry, the prose romance and the essay will be examined.

*Prerequisite:* English 18.232 or permission.

*Day Division:* 1969-70 (two hours a week).

*R. H. MacDonald*

**English 18.342** Eighteenth-Century Literature

Detailed study of authors and movements of the period 1660-1780, with special emphasis on Dryden, Swift, Pope and Johnson.

*Prerequisite:* English 18.232 or permission.

*Not offered, 1969-70.*

**English 18.348 Studies in Romanticism**

Detailed study of authors and themes in the period 1790 to 1830. In the Day Division in 1969-70 emphasis will be placed on the works of Blake and Keats. In the Evening Division in 1969-70 emphasis will be placed on Wordsworth and Byron.

*Prerequisite:* English 18.232, 18.242 or permission.

*Day Division:* 1969-70 (seminar two hours a week).

*B. W. Jones*

*Evening Division:* 1969-70 (seminar two hours a week).

*G. McKnight*

**English 18.352 English Studies II**

The required course for third year honours and major students. A select group of authors will be studied. Students with 18.232 will study the nineteenth century; those with 18.242 will study the period 1830 to the present.

*Prerequisite:* English 18.232, 18.242 or permission.

*Day Division:* Annually (four hours a week, lectures and seminar).

*T. H. Coulson (co-ordinator), J. Downey, A. W. Heidemann, R. Mathews*

*Summer:* 1969 *Evening Division* (five hours a week).

*T. J. Middlebro'*

**English 18.357 Victorian Poetry**

A detailed examination of the works of Tennyson, Browning, and Arnold, as well as an examination of important poems by Fitzgerald, Clough, Rossetti, Morris and Swinburne. The diversity of poetic theory and practice in the Victorian period will be emphasized.

*Prerequisite:* a second-year course in English.

*Day and Evening Division:* 1969-70 (seminar two hours a week).

*R. Laird*

**English 18.358 Nineteenth-Century Thought**

Readings in the Romantic and Victorian periods, emphasizing the relation between literature and ideas of culture and society. Burke, Coleridge, Carlyle, Newman, Mill, Bagehot, Ruskin, Arnold, Huxley, Butler, Morris, and Shaw receive special attention. *Not offered*, 1969-70.

**English 18.361 Twentieth-Century Poetry**

This course will trace the development of twentieth-century poetry written in English. Particular attention will be paid to the relation between the poetry and critical ideas of the poets discussed.

*Prerequisite:* a first-year course in English.

*Day Division:* 1969-70 (lectures three hours a week).

*A. T. Tolley*

*Summer:* 1969 *Day Division* (ten hours a week).

*A. T. Tolley*

**English 18.362 Major Twentieth-Century Authors**

In 1969-70, the poetry, drama, and fiction of the Anglo-Irish Literary Resurgence (1880-1940), with special consideration of works by Lady Gregory, W. B. Yeats, J. M. Synge, Sean O'Casey, Oscar Wilde, Bernard Shaw, George Moore, and James Joyce.



## English Language and Literature

*Prerequisite:* a first-year course in English.

*Day Division:* 1969-70 (lectures two hours a week).

*Lorna Young*

*Evening Division:* 1969-70 (lectures two hours a week).

*Lorna Young*

### English 18.363 Twentieth-Century Fiction

Detailed analytic study of twentieth-century fiction. The main emphasis is on British and American fiction, including the short story.

*Prerequisite:* a first-year course in English.

*Day and Evening Division:* 1969-70 (lectures two hours a week).

*Elizabeth Barrett*

### English 18.367 Contemporary Texts

Seminar in twentieth-century works of literature. In 1969-70 the course will be "A Continuity in American Poetry, Ezra Pound to the Present."

*Prerequisite:* permission of the instructor.

*Day Division:* 1969-70 (two hours a week).

*R. L. Hogg*

### English 18.372 American Literature

A survey of American literature from colonial times to the present, concentrating on poetry and the novel.

*Prerequisite:* a first-year course in English.

*Day Division:* 1969-70 (lectures three hours a week).

*J. Healy*

*Summer:* 1969 *Evening Division* (five hours a week).

*Lorna Young*

### English 18.382 Canadian Literature

A study of the development of Canadian literature in English, with special emphasis on the writers of the period 1920-1945.

*Prerequisite:* a first-year course in English or permission.

*Day Division:* 1969-70 (two hours a week).

*R. L. McDougall*

*Evening Division:* 1969-70 (two hours a week).

*R. Mathews*

*Summer:* 1969 *Day Division* (ten hours a week).

*J. Healy*

### English 18.387 Contemporary Canadian Literature

A study of selected works of contemporary Canadian authors.

*Prerequisite:* a first-year course in English or permission.

*Not offered, 1969-70.*

### English 18.403 Seminar in the English Novel

A seminar for the study and discussion of the art of the novel as exemplified by major works of fiction. Study will include varieties of form and pattern, modes of narration, imagery and symbolism, realism and naturalism. The following authors will be examined in detail: Defoe, Austen, Bronte, Dickens, James, Faulkner, Dos Passos. Some consideration will be given to the modern short story.

*Prerequisite:* honours students; others by permission of the instructor.

*Day and Evening Divisions:* 1969-70 (two hours a week).

*A. M. Beattie*

**English 18.411** Old English Poetry

Translation and study of the text of Beowulf and the Finnsburg Fragment.

*Prerequisite:* permission of the instructor.

*Day and Evening Divisions:* 1969-70 (seminar two hours a week).

*I. Pringle*

**English 18.418** Old Norse

An introductory study of the Old Norse language and literature.

*Prerequisite:* English 18.212 or an equivalent course in Old English, or permission of the instructor.

*Day and Evening Divisions:* 1969-70 (two hours a week).

*G. B. Johnston*

**English 18.436** Seminar in Shakespeare

A seminar for honours students, concentrating on critical and scholarly approaches to Shakespeare's work.

*Prerequisite:* honours students; others by permission.

*Day Division:* Annually (three hours a week, lecture and seminar).

*C. Haines*

**English 18.448** Studies in Neoclassicism

An intensive study of the origins and the thematic and rhetorical development of neoclassicism from Ben Jonson to Samuel Johnson.

*Prerequisite:* English 18.232 or permission.

*Not offered, 1969-70.*

**English 18.477** Major American Authors

A detailed examination of the thought and work of a selected group of significant American writers. In 1969-70, the following poets will be studied: Longfellow, Whitman, Emily Dickinson, Frost, Hart Crane, Stevens.

*Prerequisite:* English 18.372 or permission.

*Day Division:* 1969-70 (three hours a week).

*V. K. Chari*

**English 18.487** Selected Topics in Canadian Literature

An advanced course for majors and honours students in English. The general field of study for 1969-70 is to be the relation between French and English Canadian literature.

*Prerequisite:* English 18.382, or permission.

*Day and Evening Divisions:* 1969-70 (seminar two hours a week).

*Kathleen O'Donnell*

**English 18.488** Studies in the Literature of the Commonwealth

An examination, selective and comparative, of the non-metropolitan literatures in English of the Commonwealth. Extended attention will be given to the development of literature in Australia and to contemporary African writing. Authors selected will

## English Language and Literature

include Marcus Clarke, Randolph Stow, Patrick White, Chinua Achebe, Wole Soyinka, V. S. Naipaul and Raja Rao.

*Prerequisite:* departmental permission.

*Day and Evening Divisions:* 1969-70 (seminar two hours a week).

*J. Healy*

### English 18.498 Independent Study

Occasionally a student may undertake a piece of individual research under the supervision of a member of the department. Consult the Chairman.

### English 18.499

Group tutorials required of all honours students in their final year. This course will receive two academic credits.

### *Comparative Literature*

Honours English students should consider courses offered by the Comparative Literature Committee (see p. 48).

### Graduate Courses

**Note:** Summer reading lists should be obtained from the Department of English.

### English 18.500 Seminar in Literary Criticism

A study of specific topics or particular areas of literary criticism. In 1969-70, the seminar will examine literary criticism in the twentieth century, and attention will be given to the practical application of critical theory.

*Day and Evening Divisions:* 1969-70 (seminar two hours a week).

*T. H. Coulson*

### English 18.522 Middle English

A study of the English language and literature between the Norman Conquest and the fifteenth century. Special attention is given to fourteenth-century literature.

*Day Division:* 1969-70 (two hours a week).

*Maureen Gunn*

### English 18.538 Renaissance Studies

A detailed study of particular problems of Renaissance literature and thought. Critical and scholarly approaches to the study of the period will be emphasized.

*Day Division:* 1969-70 (seminar two hours a week).

*Barbara Garner*

### English 18.548 The Literature of Authority

A course designed to explore some of the major political, religious, philosophical, and literary presuppositions in the literature of the Augustan period, with emphasis upon Dryden, Swift, and Pope.

*Not offered, 1969-70.*

### English 18.551 Major Victorian Poets

The aim of this course is to allow the student to investigate in detail the poetry of Tennyson, Browning and Arnold, and to present his conclusions for discussion in

a seminar. The course will concentrate on poetic techniques and the aesthetic philosophies which underlie them.

*Day Division:* 1969-70 (seminar two hours a week).

*R. Laird*

**English 18.564 Modern Drama**

An intensive survey of major dramatists and the themes and theatrical traditions they represent, from Ibsen and Strindberg to the present.

*Day and Evening Divisions:* 1969-70 (seminar two hours a week).

*G. J. Wood*

**English 18.567 The Modern Novel**

The course will concentrate on the principal developments in the art of fiction since 1900. Authors included will be Joyce, James, Virginia Woolf, Conrad, Lawrence, Bennett, Forster, Waugh, Greene.

*Day and Evening Divisions:* 1969-70 (seminar two hours a week).

*A. M. Beattie*

**English 18.571 Seminar in American Poetry**

An intensive study of the work of Emerson, Thoreau and Whitman against the background of American Transcendentalism.

*Day Division:* 1969-70 (seminar two hours a week).

*V. K. Chari*

**English 18.578 Problems of Scholarship in American Fiction**

Selected studies concerning the American novel and short story from Charles Brockden Brown to the present: for example, the Gothic mode, the role of the frontier, the associationist aesthetic, the rejection of tradition, naturalism and romantic decadence, the empirical basis of morality, the study of at least two novelists in depth as representatives of their period in American intellectual life.

*Not offered, 1969-70.*

**English 18.587 The Literary Imagination in Canada**

Studies in three dimensions of cultural history: "The Temper of the Times," a descriptive approach to thought and taste in four selected decades of Canadian life; "Myths, Concepts and Ideologies," an examination of the preferred images which nourish the characteristic dialogue of a developing Canadian culture; and "Verbal Universe," an appreciation of the unique concerns and achievements of some of the more important writers in Canada. Comparative references will be made, where appropriate, to the literatures of French Canada and Australia.

*Day Division:* 1969-70 (seminar two hours a week).

*R. L. McDougall*

**English 18.590 Special Studies Seminar**

A seminar on a specialized area of literary studies, a particular author, idea, theme, myth or form. In 1969-70 the topic will be the idea of the "romantic."

*Day and Evening Divisions:* 1969-70 (seminar two hours a week).

*B. W. Jones*

**English 18.599 M.A. Thesis**

*Members of the Department*





# French

Professor; Chairman of the Department	J. S. Tassie
Assistant Professor; Assistant Chairman Professors	J. Miquet P. Clive, L. Fam, C. D. Hérisson, E. Kushner (on leave of absence, 1969-70)
Visiting Professor	L. Terreaux
Associate Professors	A. Bergens, C. P. Fleischauer, W. B. Kay (on leave of absence, 1969-70), E. F. Kaye, W. Krysinski, P. Laurette, G. Picot, A. Roth, S. Sarkany
Assistant Professors	F. Cousin, A. Elbaz, H. Fers, R. Galliani, M. Gaulin, M. Gobeil, A. Halsall R. Vigneault (on leave of absence, 1969-70), E. N. Zimmerman
Senior Lecturer	W. M. Fraser
Lecturers	O. Cragg, C. Fam (on leave of absence, 1969-70), S. Robinson
Special Lecturers	J. P. Ryngaert, J. Vinchon
Sessional Lecturers	J. Bélanger, B. Burke, P. Collet, E. Duval, R. Manning, H. Schrecker, P. Van Ruten, M. Vernet
Supervisor of Major Students	A. Halsall
Supervisor of Honours Students	J. Miquet
Supervisor of Graduate Students	E. F. Kaye

As Carleton University is situated in a bilingual community, students are encouraged to take advantage of the multiple opportunities for practical appreciation of the language. Radio, television, cinema, stage, the press, and everyday conversation are at hand to supplement academic course work. Class lectures are conducted in French. The Department also has at its disposal a fully equipped language laboratory.

## Major in French

A student wishing to major in French must have C standing or better in French 20.100, or 20.101 with permission of the Department. Such a student will take a minimum of five additional courses at the 200/300 level, at least one of which must be a 300 level course. French 20.200 is normally compulsory, and at least three courses are to be selected from French 20.210, 20.215, 20.220, 20.221, 20.225, 20.230, 20.260, 20.305, 20.310, 20.311. This will help him to consolidate his knowledge of French grammar and to gain a comprehensive view of the various aspects of French literature.

## Honours Course

Several honours programs are available. Course patterns are designed to assure a balanced appreciation of all periods of French literature, with competence in oral and written expression in the French language. Interested candidates will note the general regulations governing honours on p. 13. The Department requires in addition that candidates include practical work in the laboratory in *each* year of the program, and sit for a comprehensive examination at the end of the final year.

## French

### *Honours in French, with Minor in a Second Language*

This program is particularly suited for students intending to pursue graduate studies in the field of Romance languages. It normally consists of twenty courses after Grade 13, and will include the study of a second language other than English each year.

a) In the First year the following courses will be chosen:

French 20.100;

A course in another language (German, Italian, Spanish, Russian or Latin<sup>(\*)</sup>);

Three other courses chosen with the advice of the Department.

b) Nine additional course credits in French will be obtained, as follows:

i French 20.200 is compulsory

ii At least four courses are to be selected from French 20.210, 20.215, 20.220, 20.221, 20.225, 20.230, 20.260, 20.305, 20.310, 20.311, 20.335, 20.430, 20.440, 20.450, 20.460, 20.470, 20.490

iii Five of the nine course credits will be at the 300/400 level with a minimum of two at the 400 level.

c) i Three additional course credits in the second language chosen in First year

ii A further course or courses in an approved option.

### **Combined Honours**

Combined honours programs are available in French and Latin, French and German, French and Russian, French and English, French and Spanish, French and History, French and Political Science, and with other departments by arrangement.

The Honours programs combining two languages prepare the student either for graduate work or for the Ontario College of Education courses leading to the Interim High School Assistant's Certificate, Type A, and must be planned in close consultation with the departments concerned. The combined programs with History or Political Science are suited for various kinds of public careers.

For First year courses, see a) above.

Six additional course credits in French will be taken in the three years following:

i French 20.200 is compulsory;

ii At least three courses are to be selected in the list of courses shown in b)ii above;

iii Three of the six course credits will be at the 300/400 level, with a minimum of two at the 400 level.

Six additional credits will be taken in the second honours subject after the 100 level course. Students will seek advice from the second honours department.

### **Graduate Studies**

The department offers studies presently leading to the M.A. degree; studies at the Doctoral level will be introduced in the future and are now in their planning stage. Emphasis is attached to work in specialized fields, a particular author or period, and research on problems of literary history. A departmental bulletin is available providing more information.

General regulations for graduate studies are found on pp. 67-69. The student for the M.A. in French normally takes a minimum of five courses (without thesis) or three courses plus a thesis, and will also sit for a comprehensive examination. Provision is made for study in the field of Comparative Literature as appropriate (see p. 47).

<sup>(\*)</sup>Students must have standing in Latin 16.010 or equivalent before graduation.

**Courses Offered: 1969-70**

*Day and Evening:* 20.: 010, 100, 101, 102, 200, 202, 301\*.

*Day only:* 20.: 001, 210, 215, 220, 225, 230, 250, 260, 300, 302\*, 304\*, 305, 311, 315, 346, 401, 403\*, 405, 450, 490, 502, 530, 540, 545, 550, 570.

*Evening only:* 20.: 221, 310, 470, 498, 520, 525, 535, 585.

**French 20.001 Elementary French**

An intensive non-credit course preparing students for French 20.010. Grammar and conversation. Students must be prepared to make extensive use of the language laboratory facilities as the course is designed for those who have had no French.

No auditors.

*Texts:* Desberg and Kennan, *Modern French*; Redfern, *Writing Modern French*.

*Day Division:* Annually (five hours a week, plus five practice sessions).

*Summer:* 1969 *Day and Evening Divisions*.

*M. Gaulin and others*

**French 20.010 Readings in Modern French**

Selections by modern French authors. Exercises in grammar, vocabulary and style, with emphasis on conversation and composition. Laboratory sessions are compulsory.

*Texts:* Politzer and Hagiwara, *Active Review of French*;

Hagiwara and Politzer, *Continuons à parler*;

Carlut and Brée, *France de nos jours*;

Others to be announced.

*Day Division:* Annually (three lectures a week, plus practice session).

*Evening Division:* Annually (two lectures a week, plus practice session).

*M. Gaulin and Members of the Department*

*Summer:* 1969 *Day and Evening Divisions*.

*R. Manning*

**French 20.100 French Literature from La Chanson de Roland to Zola**

A course for students who intend to select French as their major subject. Brief but inclusive review of the development of French literature from *La Chanson de Roland* to Emile Zola, with emphasis on reading and study of representative literary works of all types. Discussion groups compulsory.

*Texts:* Sanders and Creighton, *A travers les siècles*.

Plays to be announced.

Other texts to be announced.

*Reference Texts:* Brereton, *A short history of French Literature*; Abry, Audic et Crouzet, *Histoire illustrée de la littérature française*; Salomon, *Précis d'histoire de la littérature française*.

*Prerequisite:* French 20.010 or equivalent.

*Day Division:* Annually (four hours a week, lectures and discussion group).

*Evening Division:* Annually (lectures and discussion group two evenings a week).

*Summer:* 1969 *Day and Evening Divisions*.

*C. D. Hérisson and Members of the Department*

**French 20.101 French literature from the Middle Ages to modern times**

A course for students who do not intend to select French as a major subject. An intensive study of selected literary works of all types from the Middle Ages to the twentieth century, including several examples of classical and modern theatre. Discussion groups.

## French

*Texts:* Sanders and Creighton, *A travers les siècles*.

Malraux, *La Voie royale*;

Plays to be announced.

*Reference Texts:* Brereton, *A short history of French literature*; Salomon, *Précis d'histoire de la littérature française*; Hare, *The literature of France*.

*Prerequisite:* French 20.010 or equivalent.

*Day Division:* Annually (lectures three hours a week and optional discussion group).

*Evening Division:* Annually (two lectures and optional discussion group a week).

*A. Roth and Members of the Department*

*Summer:* 1969 *Day and Evening Divisions*.

*B. Burke and M. Gobeil*

### French 20.102 French literature, modern authors

A course for students who do not intend to select French as a major subject. An intensive study of selected masterpieces in poetry, novel and theatre from the end of the nineteenth century to the present. Discussion groups.

*Texts:* Gide, *L'Immoraliste*; Camus, *L'Etranger*; Sartre, *Le Mur*, *Huis clos*; Sarraute, *L'Ere du soupçon*; Butor, *La Modification*; Ionesco, *La Cantatrice chauve*, *La Leçon*, *Les Chaises*; Beckett, *En attendant Godot*; selections from Baudelaire, Rimbaud, Apollinaire, Cendrars, Valéry Larbaud, Breton, Saint-John Perse, Supervielle, Nelligan, Hébert, Lapointe.

*Reference Text:* Boisdeffre, *Les Ecrivains français d'aujourd'hui*.

*Prerequisite:* French 20.010 or equivalent.

*Day Division:* Annually (lectures three hours a week and optional discussion group).

*Evening Division:* Annually (two lectures and optional discussion group a week).

*W. Krynski and Members of the Department*

*Summer:* 1969 *Day and Evening Divisions*.

*M. Vernet and others*

### French 20.200 Cours avancé de langue française

Normally compulsory for Majors and Honours in French. May be taken in Arts I together with one of 100, 101, 102, if Department so recommends.

Révision systématique de la grammaire française. Conversation et travaux pratiques.

*Texts:* Léon François Hoffman, *L'essentiel de la grammaire française*; *Travaux pratiques*.

*Prerequisite:* A French course numbered 100 (may be taken concurrently).

*Day Division:* Annually (three lectures a week).

*Evening Division:* Annually (two lectures a week).

*A. Bergens and Members of the Department*

### French 20.201\* Le français oral

Phonétique et conversation; travaux de laboratoire.

*Texts:* *Petit Larousse illustré*; Léon, *Improving French Pronunciation*, Vol. I & II.

*Prerequisite:* French 20.100 or 20.101 or 20.102 or permission of the Department.

*Not offered, 1969-70.*

*Summer:* 1969 *Day and Evening Divisions*.

*W. Fraser and Members of the Department*

### French 20.202 Explication de texte

Examen détaillé d'un petit nombre de chefs-d'oeuvre pour développer l'art de l'analyse des textes littéraires.



*Texts: Poètes du XVIe siècle* (Cl. Vaubourdolle); La Bruyère, *Les Caractères*, I (Cl. Larousse); J. J. Rousseau, *Discours-Lettre sur les spectacles* (Cl. Larousse); *Verlaine et les poètes symbolistes* (Cl. Larousse); other texts to be announced.

*Prerequisite:* French 20.100 or 20.101 or permission of the Department.

*Day and Evening Divisions:* Annually (two hours a week).

*P. Laurette and Members of the Department*

*Summer: 1969 Day and Evening Divisions* (half-credit course).

*P. Van Ruten and others*

### **French 20.203\*** Grammaire française

Révision systématique de la grammaire française. Travaux pratiques.

A compulsory course for Majors and Honours in French.

*Texts:* Carlut-Meiden, *French for oral and written Review*; Carly-Meiden, *Pattern Practice*.

*Suggested Grammar:* Grevisse, *Le bon usage*.

*Suggested Dictionaries:* Harrap's (English-French); J. Dubois (Français).

*Prerequisite:* A French course of the 100 level, or permission of the Department.

*Not offered, 1969-70.*

*Summer: 1969 Day and Evening Divisions.*

*E. Duval and others*

### **French 20.210** La littérature et la pensée française du 17e siècle

Le XVIIe siècle français: De Malherbe, Descartes à la querelle des Anciens et des Modernes. Auteurs spécialement étudiés: Corneille, Molière, La Fontaine, Pascal, Mme de La Fayette, Racine.

*Texts:* Lagarde et Michard, *XVIIe siècle*, Petits Classiques Bordas et Larousse.

*Prerequisite:* French 20.100 or 20.101 or permission of the Department.

*Day Division:* Annually (three lectures a week).

*M. Clive*

### **French 20.215** La littérature et la pensée française du 18e siècle

Prolongement du classicisme. Les nouvelles idées politiques, sociales, religieuses, philosophiques. Le roman et le théâtre.

*Texts:* Castex et Surer, *Manuel des études littéraires françaises: XVIIIe siècle*;

Fellows & Torrey, *Age of Enlightenment*, a choice of paperbacks.

*Prerequisite:* French 20.100 or 20.101 or permission of the Department.

*Day Division:* Annually (three lectures a week).

*C. P. Fleischauer*

*Summer: 1969 Evening Division* (two lectures a week).

*H. Schrecker*

### **French 20.220** La littérature de la période romantique

De Mme de Staël à la mort de Balzac.

*Texts:* Lagarde et Michard, *XIXe Siècle*; Chateaubriand, *Atala*, *René*; Hugo, *Poésies*;

Balzac, *Le Père Goriot*; Stendhal, *Le Rouge et le Noir*.

*Prerequisite:* French 20.100 or 20.101 or permission of the Department.

*Day Division:* Annually (three lectures a week).

*E. F. Kaye*

*Summer: 1969 Day Division* (five lectures a week).

*Topic:* La littérature du 19e siècle. Du romantisme au symbolisme.

*A. Roth*



## French

### French 20.221 La littérature post-romantique

Le réalisme et le naturalisme. Le Parnasse. Le symbolisme jusqu'à Mallarmé.

*Texts:* Lagarde et Michard, *XIXe Siècle*; Flaubert, *Madame Bovary* (Garnier); Zola, *Germinal* (L. de Poche); Maupassant, *Contes choisis* (Cl. Larousse); Les Poètes parnassiens; Extraits (Lagarde et Michard); Verlaine, *Les Poèmes saturniens*, *Les Fêtes galantes* (L. de Poche); Rimbaud, *Poésies* (L. de Poche); Mallarmé, Extraits (Lagarde et Michard).

*Prerequisite:* French 20.100 or 20.101 or permission of the Department.

*Evening Division:* 1969-70 (two lectures a week).

*H. Fers*

### French 20.225 Littérature française de la fin du naturalisme à l'existentialisme

*Texts:* Barrès, *Un Homme libre* (L. de Poche); Alain-Fournier, *Le Grand Meaulnes* (L. de Poche); Proust, *Un Amour de Swann* (L. de Poche); Gide, *La Symphonie pastorale* (L. de Poche); Malraux, *La Condition humaine* (L. de Poche); Giraudoux, *La Guerre de Troie n'aura pas lieu* (L. de Poche).

*Reference texts:* Lagarde et Michard, *XXe Siècle*.

*Prerequisite:* French 20.100 or 20.101. Major or Honours students of French may not take this course for credit if they have taken French 20.102.

*Day Division:* Annually (three lectures a week).

*A. Halsall*

### French 20.230 La littérature française de l'existentialisme au nouveau roman

*Texts:* J.-P. Sartre, *La Nausee*;

A. Camus, *Caligula*, *Le Malentendu*;

M. Leiniz, *L'Age d'homme*;

S. de Beauvoir, *L'Invitée*;

F. Sagan, *Les Merveilleux Nuages*;

A. Blondin, *Un Singe en hiver*;

J. Cabanis, *Le Bonheur du jour*;

M. Duras, *Moderato Cantabile*;

A. Robbe-Grillet, *Dans le labyrinthe*;

S. Beckett, *Théâtre*.

*Prerequisite:* French 20.100 or 20.101. Major or Honours students of French may not take this course for credit if they have taken French 20.102.

*Day Division:* Annually (three hours a week).

*M. Gobeil*

### French 20.250 Le théâtre: théorie et pratique

Etude de l'histoire du théâtre français et examen détaillé de cinq pièces. Travaux pratiques (diction, interprétation théâtrale). Une pièce de théâtre sera présentée par les étudiants du cours. Inscriptions limitées.

*Texts:* To be announced.

*Prerequisite:* French 20.100 or 20.101 or 20.102 or permission of the Department.

*Day Division:* 1969-70 (three hours a week).

*H. Fers*

### French 20.260 Littérature canadienne de langue française

Etude de la littérature canadienne faite à la lumière des mouvements tant français qu'américains.

*Texts:* G. Sylvestre, *Anthologie de la poésie canadienne française*; choix des romans importants depuis *Les Anciens Canadiens*.

*Reference Text:* Tougas, *Histoire de la littérature canadienne-française*.  
*Prerequisite:* French 20.100 or 20.101 or permission of the Department.  
*Day Division:* Annually (three lectures a week).  
 J. S. Tassie

### **French 20.300** Grammaire française

Etude systématique des éléments du discours. Travaux pratiques.  
*Suggested Grammar:* Grevisse, *Le bon usage*; other texts to be announced.  
*Prerequisite:* French 20.203\* or permission of the Department.  
*Day Division:* 1969-70 (three lectures a week).  
 J. P. Ryngaert

### **French 20.301\*** Traduction

Eléments de grammaire et de stylistique comparées; traduction de l'anglais au français.  
*Texts:* Harrap's *Shorter French and English Dictionary*; Mansion, *A Grammar of Present-day French*; Vinay et Darbelnet, *Stylistique comparée du français et de l'anglais*; Cahier d'exercices No. 1; Ritchie, *A New Manual of French Composition*.  
*Prerequisite:* French 20.203\* or permission of the Department.  
*Day and Evening Divisions:* Annually (two hours a week throughout the year).  
 J. Miquet and Members of the Department  
*Summer:* 1969 Evening Division.  
 J. Bélanger

### **French 20.302\*** La dissertation française

Les méthodes de la préparation d'un exercice littéraire sur un sujet donné.  
*Text:* Thoraval, *La Dissertation française*.  
*Prerequisite:* French 20.202\*.  
*Day Division:* 1969-70 (two lectures a week).  
 L. Fam  
*Summer:* 1969 Evening Division.  
 J. Bélanger

### **French 20.304\*** Phonétique françaises théorique

Les phonèmes. Habitudes articulatoires, syllabiques, accentuelles, rythmiques et intonatives du français.  
*Texts:* to be announced.  
*Prerequisite:* French 20.201\* or permission of the Department.  
*Day Division:* 1969-70 (two lectures a week).  
 F. Cousin

### **French 20.305** La langue et la littérature française du moyen âge

Initiation à l'ancienne langue et aux principaux courants de la littérature médiévale par l'étude de certains textes.  
*Texts:* G. Raynaud de Lage, *Introduction à l'ancien français*.  
 J. Bédier, *La Chanson de Roland*.  
 Lagarde et Michard, *Moyen Age*; D. Stone, *Tristan et Iseut*; choix de Classiques Larousse.  
*Prerequisite:* A French course at the 200 level.  
*Day Division:* 1969-70 (three lectures a week).  
 J. Miquet

## French

### **French 20.310** La Renaissance en France: Principaux courants de la pensée

Influences antiques et italiennes; platonisme et pétrarquisme; Rabelais et l'humanisme; affrontement du paganisme et de la vision chrétienne; la littérature devant les guerres de religion; Montaigne et sa conception de l'homme.

*Texts:* To be announced.

*Prerequisite:* French 20.210 or permission of the Department.

*Evening Division:* 1969-70 (three lectures a week).

*P. Clive*

### **French 20.311** La Renaissance en France: évolution des formes littéraires

Assimilation de l'apport antique aux formes littéraires du XVI<sup>e</sup> siècle; transition entre la tradition française ou marotique et les théorie de la Pléiade; épanouissement des grands genres littéraires.

*Texts:* to be announced.

*Prerequisite:* French 20.210 or permission of the Department.

*Day Division:* 1969-70 (three lectures a week).

*L. Terreaux and P. Clive*

### **French 20.315** Histoire des idées en France

Topic for 1969-70: Le mouvement des idées au XVII<sup>e</sup> siècle.

*Texts:* To be announced.

*Prerequisite:* French 20.210 or permission of the Department.

*Day Division:* 1969-70 (three lectures a week).

*G. Picot*

### **French 20.335** L'Essai dans la Littérature canadienne-française

L'évolution de la pensée d'Arthur Buies à Jean LeMoyne.

*Prerequisite:* French 20.260 or permission of the Department.

*Not offered, 1969-70.*

### **French 20.346** Histoire de la civilisation française

La France contemporaine: premier semestre, les institutions; second semestre, la vie quotidienne des Français.

*Texts:* Beaujour et Ehrmann, *La France contemporaine*.

Michaud, *Guide France*.

*Prerequisite:* French 20.210 or 20.215 or 20.220 or permission of the Department.

*Day Division:* 1969-70 (three hours a week).

*A. Elbaz*

### **French 20.401** Stylistique

Méthodes d'étude stylistique. Questions de lexicologie et analyses statistiques.

*Prerequisite:* French 20.301\* or permission of the Department.

*Day Division:* 1969-70 (two hours a week).

*L. Fam*

### **French 20.402\*** La bibliographie

Les sources du travail bibliographique et les méthodes de recherche littéraire.

*Texts:* Malclès, *La bibliographie*; Bouvier et Jourda, *Guide de l'étudiant en littérature française*; Morize, *Problems and methods of literary history*.

*Not offered, 1969-70.*

**French 20.403\*** Histoire de la langue française

Le développement de la langue française depuis ses origines.

*Texts:* Bruneau, *Petite histoire de la langue française*.

*Prerequisite:* A French course at the 200 level, or permission of the Department.

*Day Division:* 1969-70 (one lecture a week).

*G. Picot*

**French 20.405** Linguistique générale et linguistique française

Système phonologique du français moderne. Morphologie. Syntaxe.

*Prerequisite:* French 20.202\* or 20.302\* or permission of the Department.

*Day Division:* 1969-70 (two hours a week).

*P. Laurette*

**French 20.430** La critique littéraire en France

Topic for 1968-69: La nouvelle critique.

*Prerequisite:* French 20.210, 20.215, 20.220 or 20.310.

*Not offered, 1969-70.*

**French 20.440** Le roman français

*Prerequisite:* French 20.210 or 20.215 or 20.220 or 20.225 or 20.230, or permission of the Department.

*Not offered, 1969-70.*

**French 20.450** La poésie française

Evolution des formes poétiques, des lois de la versification, des thèmes et des symboles.

Topic for 1969-70: Verlaine et Rimbaud.

*Prerequisite:* French 20.220 or 20.225 or 20.310 or permission of the Department.

*Day Division:* 1969-70 (two hours a week).

*C. D. Hérisson*

**French 20.460** Le théâtre en France

Etude des genres dramatiques à travers leurs principaux représentants.

*Prerequisite:* French 20.210 or 20.215 or 20.220 or 20.225 or permission of the Department.

*Not offered, 1969-70.*

*Summer: 1969 Day Division* (five lectures a week).

*Topic:* Corneille (tragédies et comédies).

*P. Collet*

**French 20.470** Seminar on a topic of French literature

For honours and graduate students. Topic for 1969-70: La conception de l'histoire au XVIII<sup>e</sup> siècle.

*Prerequisite:* A course at the 300 level or permission of the Department.

*Evening Division:* 1969-70 (two hours a week).

*R. Galliani*

**French 20.490** Tutorial

For honours and graduate students. Topic for 1969-70: Alfred de Vigny.

*Prerequisite:* A course at the 300 level or permission of the Department.

*Day Division:* 1969-70 (two hours a week).

*E. F. Kaye*

## French

### **French 20.498** Initiation à la recherche

Etablissement d'une bibliographie, de fiches, d'un plan, d'une édition critique, etc.  
Petit mémoire ou dissertation.

*Prerequisite:* Permission of the Department. Open to fourth year Honours and graduate students.

*Evening Division:* 1969-70 (one lecture a week and consultation).

*A. Bergens*

### **French 20.500** Recherche dirigée

Travail sur un sujet proposé par l'étudiant.

*Prerequisite:* Permission of the Department. Open to fourth year Honours and graduate students.

### **French 20.501** Lexicologie littéraire

Problèmes de lexicologie. Description du vocabulaire d'une oeuvre. Problèmes statistiques d'une oeuvre.

*Prerequisite:* French 20.405 or permission of the Department.

*Not offered, 1969-70.*

### **French 20.502** Stylistique comparée du français et de l'anglais

Etude comparée des systèmes phonologiques, morphologiques, syntaxiques, sémantiques, lexicologiques de l'anglais et du français.

*Prerequisite:* French 20.301\* or 20.401 or permission of the Department.

*Day Division:* 1969-70 (two hours a week).

*F. Cousin*

### **French 20.505** Introduction to Romance linguistics

The historical development of the principal Romance languages, stressing their inter-relationships.

*Prerequisites:* French 20.305 or 20.310 or Spanish 38.415, and knowledge of Latin.

*Not offered, 1969-70.*

### **French 20.510** Dialectologie française

Introduction aux méthodes de l'analyse dialectologique. Exploitation de textes primitifs français et canadiens.

*Not offered, 1969-70.*

### **French 20.520** Le roman canadien de langue française

Topic for 1969-70: Gabrielle Roy; Yves Thériault.

*Prerequisites:* French 20.260 and 20.335 or permission of the Department.

*Evening Division:* 1969-70 (two hours a week).

*M. Gaulin and J. S. Tassie*

### **French 20.521** La poésie canadienne de langue française

Etude de Saint-Denys-Garneau, Anne Hébert, Alain Grandbois et la jeune génération.

*Prerequisites:* French 20.260 and 20.335 or permission of the Department.

*Not offered, 1969-70.*

### **French 20.522** Le Théâtre dans la littérature canadienne-française

Evolution du genre au Canada-Français. Etude des principaux auteurs.

*Prerequisites:* French 20.260 and 20.335 or permission of the Department.

*Not offered, 1969-70.*



**French 20.525** Aspects de la littérature médiévale

Topic for 1969-70: Etude de mises en prose dans l'épopée et dans le roman courtois.

*Prerequisite:* French 20.305.

*Evening Division:* 1969-70 (two hours a week).

*J. Miquet*

**French 20.530** Problèmes de l'histoire littéraire au XVI<sup>e</sup> siècle

Topic for 1969-70: Ronsard; le théâtre de la Renaissance.

*Prerequisite:* French 20.310.

*Day Division:* 1969-70 (two hours a week).

*L. Terreaux and H. P. Clive*

**French 20.535** Aspects du classicisme

Topic for 1969-70: Molière.

*Prerequisite:* French 20.210 or 20.460.

*Evening Division:* 1969-70 (two hours a week).

*G. Picot*

**French 20.540** Penseurs et réformateurs du 18<sup>e</sup> siècle français

Topic for 1969-70: Rousseau.

*Prerequisite:* French 20.215 or 20.315.

*Day Division:* 1969-70 (two hours a week).

*C. P. Fleischauer*

**French 20.545** Le romantisme

Etude approfondie d'un aspect important du romantisme. Topic for 1969-70:

Alphonse de Lamartine.

*Prerequisite:* French 20.220.

*Day Division:* 1969-70 (two hours a week).

*L. Fam*

**French 20.550** Aspects de la littérature du XX<sup>e</sup> siècle

Topic for 1969-70: Sartre.

*Prerequisite:* French 20.225.

*Day Division:* 1969-70 (two hours a week).

*M. Gobeil and E. Zimmerman*

*Summer:* 1969 *Evening Division* (two lectures a week).

Topic: Le nouveau roman.

*W. Krynski*

**French 20.570** Seminar on a particular author

Study of the work of one of the major authors of French literature. Papers and reports. Topic for 1969-70: *Mérimée* (romans, contes, nouvelles, théâtre).

*Texts:* Mérimée, *Romans et nouvelles* (Cl. Garnier) 2 vol., other texts to be announced.

*Prerequisite:* French 20.220 or permission of the Department.

*Day Division:* 1969-70 (two hours a week).

*C. D. Hérisson*

## French

### French 20.585 Seminar on a problem of literary history

Topic for 1969-70: La littérature populaire en France: du fabliau au roman populiste et populaire.

*Evening Division*: 1969-70 (two hours a week).

*A. Roth*

*Summer*: 1969 *Day Division* (five lectures a week).

Topic: La nouvelle de Manpassant à Morand.

*S. Sarkany*

### French 20.599 M.A. Thesis

# Geography

Professor	G. C. Merrill
Professor; Chairman of the Department	Philip E. Uren
Associate Professors	Duncan M. Anderson, Denis P. Fitzgerald, J. Peter Johnson, Jr., P. J. Williams
Assistant Professors	D. R. F. Taylor, J. E. Tunbridge, Thomas P. Wilkinson
Visiting Professor	Alfred Jahn
Sessional Lecturers	Hari S. Anand, E. J. Miles, A. D. Stanley

Geography undergraduate courses after the First year are categorised as follows:

Group I	Geography 45.250	(Europe)
	Geography 45.315	(North America)
	Geography 45.320	(Humid Tropics)
	Geography 45.330	(Developing Nations of Inter-tropical Africa)
	Geography 45.360*	(Soviet Union)
	Geography 45.361*	(East Europe)
	Geography 45.430	(Northlands)
Group II	Geography 45.210	(Physical Geography)
	Geography 45.230	(Cultural Geography)
	Geography 45.310*	(Geomorphology)
	Geography 45.311*	(Models of Geomorphic Activity)
	Geography 45.325	(Cartography)
	Geography 45.331*	(Theory & Concepts in Human Geography)
	Geography 45.333*	(Regional Development & Planning in Canada)
	Geography 45.334*	(Geography of a Selected Drainage Basin)
	Geography 45.340	(Economic Geography)
	Geography 45.345	(Climatology)
	Geography 45.401*	(Problems in Human Geography)
	Geography 45.402*	(Problems in Physical Geography)
	Geography 45.411*	(Quaternary Geography)
	Geography 45.412*	(Cartographic Morphometry)
	Geography 45.413*	(Hydroclimatology)
	Geography 45.414*	(Micrometeorology)
	Geography 45.415*	(Geomorphological Aspects of Slope Development)
	Geography 45.416*	(Engineering Geomorphology)
	Geography 45.420	(Urban Geography)
	Geography 45.435	(Historical Geography)
	Geography 45.440	(Political Geography)
	Geography 45.445*	(Land Resource Use)
Group III	Geography 45.200	(Geographic Methods)
	Geography 45.410	(Field Geography)
	Geography 45.490	(Tutorial in Geography)
	Geography 45.498	(Honours Research Essay)

## Pass Course

Students majoring in Geography in the Pass Course are required to complete six courses in Geography including at least one from Group I and two from Group II. First year students contemplating majoring in geography, are advised to take a 100 level geography course.

## Geography

### Honours Course

Honours programs may be entered from the Honours First year in the Social Sciences (see p. 27) or by transfer from the Pass Course if the appropriate standing has been attained. Students reading for an Honours degree in Geography must satisfy the general University regulations for Honours (see p. 13).

A program of courses is to be selected by each student in consultation with the Chairman of the Department. Geography 45.498 (Honours Research Essay) carries the credit of one full course. In determining the class of an honours candidate's degree, all geography courses will be counted.

The recommended program of courses followed by an honours candidate is outlined below.

#### *Year I*

1. One 100 level Geography course.

#### *Year II*

1. Geography 45.200.
2. Geography 45.210 or one course from Group I.
3. One other Geography course.
4. } Two electives, one of which should be preferably a third language, or an  
and } additional year of a second language, or one of Mathematics 69.100, 69.101,  
5. } 69.130 or 69.250.

#### *Year III*

- 1.-3. Three courses, one from Group I and two from Group II.

#### *Cultural Geography Option:*

4. One course in a Social Science.
5. One elective.

#### *Physical Geography Option:*

4. One course in a Physical or Natural Science, OR, one of Mathematics 69.100, 69.101, 69.130, or 69.250 (whichever not taken in Arts II).
5. One elective.

#### *Year IV*

1. One course from either of Groups I or II.
2. Geography 45.490.
3. Geography 45.498.

#### *Cultural Geography Option:*

Two courses above the 100 level from the Social Sciences or allied subjects previously selected.

#### *Physical Geography Option:*

4. } Two courses above the 100 level from the natural or physical sciences or allied  
and } subjects previously selected.  
5. }

Students wishing to enter the Type A specialist certificate course at an Ontario College of Education are advised to consult the Department as early as possible in order that an appropriate program can be arranged.

### Graduate Studies

The Department of Geography offers studies leading to the degree of Master of Arts to full-time students. Thesis topics must be chosen from fields of faculty interest and experience. A list of these is available upon request.

The candidate will be required to:

- a) meet the requirements for entry and graduation as set by the Faculty of Graduate Studies,
- b) prepare a thesis (Geography 45.599), and defend it,
- c) take three additional approved courses,
- d) demonstrate a reading knowledge of a language other than English.

### **Earth Science 45.100**

Introduction to analysis of maps and aerial photographs. Earth as a planet; rocks and minerals; the earth's crust, the major land forms, deformation and movements; the agents of erosion; the genetic study of land forms; climate and oceans; soils and vegetation.

*Not offered, 1969-70.*

### **Geography 45.101 The Geographic Web**

This course will review problems of natural and urban-economic environments. Case studies will play a major role, and local field work will be an important device in promoting perception and understanding of environmental problems.

*Reference Text:* To be announced.

*Day Division:* Annually (lectures two hours a week, laboratory two hours a week, field excursions).

*J. E. Tunbridge and T. P. Wilkinson*

### **Geography 45.112\* Elements of Physical Geography**

The agents of erosion; the genetic study of land forms; climate and oceans; soils and vegetation.

*Day Division:* 1969-70 (lectures two hours a week, laboratory two hours a week, one field excursion. This course is the second term of Earth Science 45.100).

*T. P. Wilkinson*

### **Geography 45.200 Geographic Methods**

A service course intended to equip the specialist in Geography with an understanding of the techniques used in the analysis of geographic phenomena. Air-photo interpretation, data and bibliographic resources, cartographic data sources, methods of analysis and presentation, interviewing techniques, introductory statistical analysis, and introductory surveying.

*Reference Texts:* To be announced.

*Day Division:* Annually (lectures two hours a week, laboratory two hours a week, and a two week field camp).

*J. E. Tunbridge, J. P. Johnson and Members of the Department*

### **Geography 45.210 Physical Geography**

The physical systems of the earth's surface and atmosphere and their geographic significance.

*Day Division:* Annually (lecture two hours a week, laboratory two hours a week, *T. P. Wilkinson and J. P. Johnson*

### **Geography 45.230 Cultural Geography**

The development and distribution of human societies with particular reference to both culture and habitat.

*Text:* Dohrs and Sommers, *Cultural Geography: Selected Readings.*

*Reference Text:* Broek and Webb, *A Geography of Mankind.*

*Day Division:* 1969-70 (lectures and discussion three hours a week).

*D. M. Anderson, G. C. Merrill and P. E. Uren*



## **Geography**

### **Geography 45.250 Europe**

The physical and cultural regions of Europe will be examined. Emphasis will be placed on the influence of the varying physical and cultural resources on the evolving patterns of European organization and relationships, with particular stress on Western Europe.

*Not offered, 1969-70.*

### **Geography 45.310\* Geomorphological Techniques**

Field and laboratory methods used in the analysis of landforms and geomorphic processes. (This course is also listed as Geology 45.413\*).

*Prerequisites:* Geography 45.200 and Geography 45.210, or permission of the instructor.

*Day Division:* Annually (combined lecture and laboratory six hours a week, first term).

### **Geography 45.311\* Models of Geomorphic Activity**

Geomorphic processes and their related landforms with emphasis on glacial, periglacial and fluvial activity. (This course is also listed as Geology 45.414\*).

*Prerequisites:* Geography 45.200 and Geography 45.210, or permission of the instructor.

*Day Division:* Annually (lectures two hours a week, laboratory or discussion three hours a week, second term).

### **Geography 45.315 North America**

This course outlines the physical, historical and economic geography of North America as a whole. Principal regions of the continent are dealt with in detail.

*Prerequisite:* Permission of the Department.

*E. Miles*

### **Geography 45.320 Geography of the Humid Tropics**

A comprehensive regional study of the humid tropical environment with special emphasis upon Latin America, the Caribbean and Africa. Indigenous economics; the social and economic problems and potentialities of developing areas.

*Not offered, 1969-70.*

### **Geography 45.325 Cartography**

The history and development of map making. The compilation, production and uses of the modern topographic map. Special purpose maps and their use, construction and development.

*Reference Texts:* Raisz, *Principles of Cartography*.

Robinson, *Elements of Cartography*.

Monkhouse and Wilkinson, *Maps and Diagrams*.

*Prerequisite:* Permission of the instructor.

*Day Division:* 1969-70 (lectures and laboratory four hours a week).

*D. R. F. Taylor*

### **Geography 45.330 Developing Nations of Inter-tropical Africa**

Geographical aspects of the problems and potential of the developing nations of inter-tropical Africa. The interaction of men and environment will be examined as well as the historical developments which have led to some of the present day situations. (This course is also listed as Anthropology 45.330).

*Reference Texts:* To be announced.

*Prerequisite:* Permission of the instructor.

*Day Division:* 1969-70 (lectures and discussion three hours a week).

*D. R. F. Taylor*

### **Geography 45.331\*** Theory and Concepts in Human Geography

This course examines the principles of human geography, with particular reference to modern concepts.

*Not offered, 1969-70.*

### **Geography 45.333\*** Regional Development and Planning in Canada

Introduction to land and water resource management in Canada, with chief emphasis on Ontario. The evaluation of the conservation movement, the drainage basin authority, and the interrelationships between conservation, regional development, and land resource planning. Specific legislation is examined.

*Prerequisite:* Permission of the instructor.

*Day Division:* 1969-70 (lectures two hours a week, one hour discussion group, first term).

*D. M. Anderson*

### **Geography 45.334\*** Geography of a Selected Drainage Basin

An examination of problems in a specific drainage basin. Emphasis will be placed on coordination of local and regional authorities responsible for water resources, pollution, recreation, land use and urban development and the practical problems encountered.

*Prerequisite:* Permission of the instructor.

*Not offered, 1969-70.*

### **Geography 45.340** Economic Geography

Basic concepts of location theory. These concepts are applied to the study of the regional interrelation of economic activities in the world, with special emphasis on Canada.

*Prerequisite:* Permission of the instructor.

*Evening Division:* 1969-70 (lectures and discussion two hours a week).

*Lecturer to be announced*

### **Geography 45.345** Climatology

Physical, dynamic and applied climatology: synoptic meteorology, weather modifications with special reference to arid areas; general circulation; microclimatology.

*Reference Texts:* Pettersen, *Introduction to Meteorology*.

Hare, *The Restless Atmosphere*.

*Prerequisite:* Geography 45.210 or permission of the instructor.

*Day Division:* 1969-70 (lectures and discussion three hours a week).

*H. Anand*

### **Geography 45.360\*** Soviet Union

This course examines the geographic basis of Soviet society. Particular emphasis is placed on the role of physical factors, including location, size, climate, vegetation, and soils in the economic and political development of the Soviet Union.

*Prerequisite:* Permission of the instructor.

*Day Division:* 1969-70 (lectures and discussion three hours a week, second term).

*D. P. Fitzgerald*

## **Geography**

### **Geography 45.361\* East Europe**

This course examines the geographic basis of East European society. Particular emphasis is placed on the role of physical factors, including location, size, climate, vegetation, and soils in the economic and political development of East Europe.

*Prerequisite:* Permission of the instructor.

*Day Division:* 1969-70 (lectures and discussion three hours a week, first term).

*P. E. Uren*

### **Geography 45.401\* Problems in Human Geography**

A course designed to permit a student to pursue his interests in a selected field of human geography. The student prepares papers for discussion with his tutor.

*Prerequisites:* Final-year Honours standing and permission of the Chairman.

*Day Division:* Annually (hours arranged) first and second terms.

*Members of the Department*

### **Geography 45.402\* Problems in Physical Geography**

A course designed to permit a student to pursue his interests in a selected field of physical geography. The student prepares papers as the basis for discussion with his tutor.

*Prerequisites:* Final-year Honours standing and permission of the Chairman.

*Day Division:* Annually (hours arranged) first and second terms.

*Members of the Department*

### **Geography 45.410 Field Geography**

The principles and techniques of analysis, mapping and recording data in the field. Further information may be had on application to the Department.

*Prerequisite:* Geography 45.200 or permission of the instructor.

*Not offered, 1969-70.*

### **Geography 45.411\* Quaternary Geography**

Changes in the physical environment of the Earth during and subsequent to the last ice age. (This course is also listed as Geology 45.415\*).

*Prerequisites:* Geography 45.200 and Geography 45.210, or permission of the instructor.

*Day Division:* Annually (lectures three hours a week, first term).

*J. P. Johnson*

### **Geography 45.412\* Cartographic Morphometry**

Techniques of morphometric analysis with maps and field survey and applications to geomorphology and hydrology.

*Prerequisites:* Geography 45.200 and Geography 45.210, or permission of the instructor.

*Day Division:* Annually (lectures three hours a week, second term).

*T. P. Wilkinson*

### **Geography 45.413\* Hydroclimatology**

Spatial problems of measurement and analysis in the hydrologic cycle.

*Prerequisite:* Geography 45.345 or permission of the instructor.

*Not offered, 1969-70.*

### **Geography 45.414\* Micrometeorology**

*Prerequisite:* Geography 45.345 or permission of the instructor.

*Not offered, 1969-70.*

**Geography 45.415 \* Geomorphological Aspects of Slope Development**

The various forms of sloping ground, their origin and present behaviour in relation to environment. Landslides, mudflows, creep, soil erosion; criteria for relative stability.  
*Prerequisite:* Permission of the instructor.

*Day Division:* 1969-70 (lectures three hours a week, laboratory three hours a week, first term).

*P. J. Williams*

**Geography 45.416 \* Engineering Geomorphology**

Types of terrain and their significance for resource development and engineering works. Ground surface features and naturally occurring processes will be examined with emphasis on those relevant to highway, pipeline and other construction. (This course is also listed as Geology 45.418\*).

*Prerequisite:* Permission of the instructor.

*Day Division:* 1969-70 (lectures three hours a week, second term).

*P. J. Williams*

**Geography 45.420 Urban Geography**

Study of urban systems: size, spacing, function of cities. Economic base, central place theory, urbanization and economic development. Analysis of internal structure of cities with emphasis on principles of land use and systems of circulation.

*Prerequisite:* Permission of the instructor.

*Day Division:* 1969-70 (lectures and discussion three hours a week).

*J. E. Tunbridge*

**Geography 45.430 Geography of the Northlands**

An analysis of the physical characteristics, historical geography, economic resources, settlement patterns and problems, and the future development of Arctic and Sub-arctic lands. Particular emphasis is placed on Canada, Scandinavia and the U.S.S.R.  
*Reference Texts:* G. H. Kimble and D. Good, *Geography of the Northlands*.

*P. Baird, Polar Regions. The Canadian Oxford Atlas.*

*Prerequisite:* Permission of the instructor.

*Day Division:* 1969-70 (lectures and discussion three hours a week).

*D. P. Fitzgerald*

**Geography 45.435 Historical Geography**

A study is made of the relation of man, habitat, and economy of past eras. The role of man as an ecologic dominant is stressed. The geographic setting of the past is reconstructed for a number of societies.

*Reference Texts:* To be announced.

*Prerequisite:* Permission of the instructor.

*Not offered, 1969-70.*

**Geography 45.440 Political Geography**

This course examines the geographic structure of the nation state, including capitals and "core areas", boundaries and frontiers, and global patterns of political activity.

*Prerequisite:* Permission of the instructor.

*Not offered, 1969-70.*

## Geography

### **Geography 45.445\*** Land Resource Use

This course will examine, from both theoretical and empirical approaches, the nature and problems of man's use of land resources. The emphasis will be on non-urban land use in the North American context. The impact of the urbanization process on land use patterns and conflicts will be explored. Fourth year honors students.

*Prerequisite:* Permission of the instructor.

*Day Division:* 1969-70 (lectures and discussion three hours a week, second term).

*D. M. Anderson*

### **Geography 45.490** Tutorial in Geography

The development of ideas and methods in Geography. Examination and discussion of original works.

*Prerequisite:* Permission of the instructors.

*Day Division:* Annually (hours arranged).

*D. P. Fitzgerald and J. P. Johnson*

### **Geography 45.498** Honours Research Essay

Candidates for Honours in Geography are required to write an Honours Research Essay during their final year. The subject for research will be determined in consultation with the Department and a supervisor will be assigned. The candidate will be orally examined upon his essay after presentation.

*Prerequisite:* Permission of the Chairman of the Department.

*Day Division:* Annually (hours arranged).

*Members of the Department*

## **Graduate Courses**

Fourth year honours students may, with permission of the Department, be admitted to these courses.

### **Geography 45.500** Methodology

A seminar in the history of geographical thought and methodology.

*Not offered, 1969-70.*

### **Geography 45.510\*** Channel Form and Process

Hydraulic geometry, alluvial morphology and palaeomorphs of channel activity.

(This course is also listed as Geology 45.543\*).

*Not offered, 1969-70.*

### **Geography 45.511\*** Drainage Basin Processes

Examination of selected physical problems in the origin and development of drainage systems and watersheds. (This course is also listed as Geology 45.544\*).

*Not offered, 1969-70.*

### **Geography 45.512\*** Experimental Geomorphology

Instrumental techniques for investigation of hydrological and thermal processes near the earth's surface. Laboratory and field procedures concerned with soil-water free energy relationships. (This course is also listed as Geology 45.547\*).

*Day Division:* 1969-70 (lectures, seminars and laboratory five hours a week, first term).

*Prerequisite:* Geography 45.413 or permission of the instructor.

*P. J. Williams*



**Geography 45.514\*** Periglacial Geomorphology

Permafrost, its distribution and significance; seasonal ground freezing; ground thermal regime; the physical and thermodynamic properties of freezing and thawing soils; terrain features ascribable to frost action; solifluction and patterned ground. (This course is also listed as Geology 45.546\*).

*Prerequisites:* Geography 45.411 and Geography 45.413, or permission of the instructor.

*Day Division:* 1969-70 (lectures, seminars and laboratory five hours a week, second term).

**Geography 45.515** Glaciology

The study of ice and snow in all its aspects. (This course is also listed as Geology 67.545).

*Prerequisite:* Permission of the instructor.

*Evening Division:* 1969-70 (lectures three hours a week).

*A. D. Stanley and others*

**Geography 45.525\*** Computer Mapping

A consideration of computer mapping techniques and practical application of these techniques.

*Not offered, 1969-70.*

**Geography 45.526\*** , National Atlases

A consideration of the cartographic techniques and problems in the preparation of selected National Atlases.

*Not offered, 1969-70.*

**Geography 45.530** Problems of African Development

A consideration of the problems of development facing African countries today and an analysis of the developmental approaches possible.

*Prerequisite:* Permission of the instructor.

*Day Division:* 1969-70 (seminars three hours a week).

*D. R. F. Taylor*

**Geography 45.531\*** Selected Studies in the Human Geography of Arctic and Sub-arctic Lands.

A seminar in which during 1969 emphasis will be placed on the social and economic development problems of the Canadian and Soviet Arctic and sub-arctic.

*Prerequisite:* Permission of the instructor.

*Day Division:* 1969-70 (seminars two hours a week, first term).

*D. P. Fitzgerald*

**Geography 45.543\*** Land Resource Theory

A seminar in theories relating to land use. Work of von Thünen, Dunn, Alonzo, Krutilla, Kneese, Barlowe, Clawson and Firey to be examined and related.

*Prerequisite:* Permission of the instructor.

*Day Division:* (seminars three hours a week, first term).

*D. M. Anderson*

**Geography 45.544\*** Recreational Land Use

This course will explore post World War II trends in recreational land use, and review problem areas and current research activity in this field.

## **Geography**

*Prerequisite:* Permission of the instructor.

*Day Division:* (seminars three hours a week, second term).

*D. M. Anderson*

### **Geography 45.550\*** Selected Studies of Frontier Settlement

A seminar on the characteristics of settlement along the edges of the ecumene. In 1970 special emphasis will be placed on frontier settlement in the Canadian sub-arctic, tropical Asia, and the dry lands of the Middle East.

*Prerequisite:* Permission of the instructor.

*Day Division:* 1969-70 (seminars two hours a week, second term).

*D. P. Fitzgerald*

### **Geography 45.590** Graduate Tutorial in Geography

A systematic field will be selected for special study on a tutorial basis.

*Day Division:* Annually (hours arranged).

*Members of the Department*

### **Geography 45.599** M.A. Thesis

Candidates will prepare a thesis based upon their own research, and defend it by an oral examination. The thesis is equivalent to two full courses.

# Geology

Professor	F. K. North (on leave of absence, 1969-70)
Associate Professor;	
Chairman of the	
Department	R. W. Yole
Associate Professors	R. L. Brown, G. Y. Chao, J. A. Donaldson, P. A. Hill, J. M. Moore, Jr., W. M. Tupper
Assistant Professors	K. Hooper, G. B. Skippen
Special Lecturer	R. W. Boyle
Sessional Lecturers	A. J. Baer, P. J. Hood, E. Irving, J. A. Soles, A. D. Stanley
Visiting Research Associate	E. W. Reinhardt
Chief Demonstrator	J. L. Craft
Demonstrators	J. G. MacDonald, Mary A. Wickens
Chief Technician	J. Hogg

## B.Sc. (Major) Program

The B.Sc. program in Geology is of four years duration beyond Senior Matriculation or Qualifying University year. A total of twenty courses is required as follows:

- a) The course requirements of the First year of the general B.Sc. program (p. 52).
- b) At least ten courses in Geology, of which Geology 67.100 and all second and third year courses are mandatory (Geology 67.100 may be taken in either Qualifying or First year).
- c) At least six courses in the other sciences, including Mathematics<sup>(1)</sup>. Among these, either Mathematics 69.100 or 69.101 is mandatory, and at least two first year science or mathematics courses must be passed before registration for second year Geology courses will be permitted.
- d) Three approved courses in the Faculty of Arts.
- e) One course chosen from Science, Arts or Engineering.

A three-year program for students not intending to become professional geologists is also available. Requirements are the same as for the B.Sc. program outlined above, except that no courses above the 300 series are required, and the total courses will number fifteen, including seven Geology courses and at least five science courses outside of Geology, including Mathematics 69.100 or 69.101.

A typical program is as follows:

Year I	Year II	Year III	Year IV
Geology 67.100 <sup>(a)</sup>	Geology 67.221*	Geology 67.325	Three Geology
Chemistry 65.100	Geology 67.284*	Geology 67.385	courses at the
Physics 75.100 or	Geology 67.225	Geology 67.335	400 level
Biology 61.100 <sup>(b)</sup>	Geology 67.235	Second Year	Second Year
Mathematics 69.100	Biology 61.100 or	Science Course	Science Course
Arts Elective	Physics 75.100 <sup>(c)</sup>	Arts Elective	Elective
	Arts Elective		(Arts, Science Engineering)

<sup>(1)</sup>All major and honours students should note that their selection of science courses, including Mathematics, should be made with the prerequisites for subsequent Geology courses in mind.

N.B. Certain courses in the 200 and 300 series may be arranged in groups of half course credits for non-geology majors in consultation with the department.

<sup>(a)</sup>May be replaced by another science course if taken in Qualifying year.

<sup>(b)</sup>If Grade 13 Physics taken, Biology 61.100 here and vice versa.

<sup>(c)</sup>May be replaced by a second year science course in certain circumstances.

## Geology

### B.Sc. (Honours) Program

- a) University requirements concerning Honours standing must be maintained (p. 13 and pp. 52-53).
- b) Courses as prescribed for the B.Sc. (Major) program are required, except that Geology 67.498 (thesis) is one of the mandatory courses in Geology, and a course in Mathematics beyond first year level is mandatory in the group of six required in other sciences.<sup>(1)</sup>
- c) The Science Faculty languages requirement must be met (p. 53) by demonstrating reading proficiency in French, German or Russian.
- d) A comprehensive oral examination is given at the end of Fourth year.

### Graduate Studies

The Department offers instruction leading to the degrees of Master of Science and Doctor of Philosophy. Details may be obtained from the Chairman.

The candidate for the Master of Science degree will be required to:

- a) comply with the general regulations of the Faculty of Graduate Studies, (p. 67),
- b) if entering from another University, write a preliminary orientation examination in the geological sciences,
- c) take Geology 67.500,
- d) take two additional 500 series courses in Geology, or, in special cases, two full courses in an ancillary science at the Honours level on recommendation of the student's supervisory committee,
- e) take such additional non-credit courses in ancillary sciences or Geology as may be required by the supervisory committee,
- f) demonstrate a reading knowledge of a language other than English, relevant to the candidate's field of research and acceptable to the Department,
- g) prepare and defend a thesis based on the candidate's own research.

The candidate for the degree of Doctor of Philosophy will be required to:

- a) comply with the general regulations of the Faculty of Graduate Studies,
- b) take a preliminary orientation examination if entering from another university,
- c) prove research ability either through satisfactory completion of theses, reports or papers or by equivalent evidence provided during one complete year of graduate studies at Carleton,
- d) take Geology 67.500, and at least one other graduate course in Geology prescribed by the Department,
- e) take such other formal or directed reading courses as may, in the opinion of the candidate's supervisory committee, be desirable as preparation for the comprehensive examinations,
- f) demonstrate a reading knowledge of geological subjects in a language other than English, relevant to his field of research and acceptable to the Department,
- g) take departmental comprehensive examinations in general geology and related sciences, after one academic year of full-time residence, and subsequent examinations in two fields of specialization,
- h) prepare a thesis, on a problem acceptable to the Department, which contributes to basic knowledge in the geological sciences or immediately related fields,
- i) defend his thesis in public.

<sup>(1)</sup>All major and honours students should note that their selection of science courses, including Mathematics, should be made with the prerequisites for subsequent Geology courses in mind.

N.B. Certain courses in the 200 and 300 series may be arranged in groups of half course credits for non-geology majors in consultation with the department.

In the following listing, full courses end in "0" or "5", half courses (first term) in '1' or '3', and half courses (second term) in '2' or '4'. An asterisk follows all half-courses.

### **Geology 67.100 General Geology**

The earth in space; evolution of the continents and oceans; rocks and minerals; mountain building and deformation; the cycle and agents of erosion; the history of life and the growth of geological ideas.

*Text:* Stokes and Judson, *Introduction to Geology*.

*Day Division:* Annually (lectures two hours a week, laboratory three hours a week; two field excursions in the first term).

*Evening Division:* 1969-70 (lectures and laboratories five hours a week, two half-day field excursions first term).

*Note:* If Geology 67.100 has been taken previously, Earth Science 45.100 will carry only a half credit, and vice versa.

*A. J. Baer and J. A. Donaldson*

### **Geology 67.201\* 67.202\* Introductory Geology for Engineers**

Fundamentals of geology with emphasis on engineering aspects.

*Text:* Gilluly, Waters and Woodford, *Principles of Geology*.

*Reference Texts:* Holmes, *Principles of Physical Geology*, Leggett, *Geology and Engineering*.

*Day Division:* 1969-70 (lectures three hours a week, laboratory three hours a week, two field excursions, offered in both terms.

*R. L. Brown* (67.201\*, first term).

*P. A. Hill* (67.202\*, second term).

### **Geology 67.221\* (220 in part) Crystallography and Optical Mineralogy**

Morphological study and classification of crystals, principles of optical crystallography.

*Text:* Bloss, *Introduction to the Methods of Optical Crystallography*.

*Reference Texts:* Mason and Berry, *Elements of Mineralogy*.

*Deer, Howie and Zussman, Introduction to the Rock-forming Minerals.*

*Prerequisite:* Geology 67.100.

*Day Division:* 1969-70 (lectures two hours a week, laboratory three hours a week, first term).

*Lecturer to be announced*

### **Geology 67.225 Mineralogy and Petrology I**

(May be taken as **67.223\*** Mineralogy I or **67.224\*** Petrology I for half course credit by non-Geology majors).

Introduction to crystal chemistry, physical mineralogy and systematic mineralogy, X-ray techniques, petrography of igneous, sedimentary and metamorphic rocks.

*Texts:* Mason and Berry, *Elements of Mineralogy*.

*Deer, Howie and Zussman, Introduction to the Rock-forming Minerals.*

*Bayly, Introduction to Petrology.*

*Reference Texts:* Wahlstrom, *Petrographic Mineralogy*.

*Williams, Turner and Gilbert, Petrography.*

*Prerequisite:* Geology 67.100.

*Day Division:* 1969-70 (lectures two hours a week, laboratory three hours a week).

*G. Y. Chao and J. M. Moore*



## Geology

### Geology 67.235 Palaeontology and Stratigraphy I

(May be taken as **67.233\*** Palaeontology I or **67.234\*** Stratigraphy I for half course credit by non-Geology majors)

Principles of palaeontology, stratigraphy and sedimentology. Regional geology of North America.

*Texts:* Beerbower, *Search for the Past*, 2nd edition.

Clark and Stearn, *Geological Evolution of North America*.

*Reference Texts:* G.S.C. Geology & Economic Minerals of Canada, 5th edition.

Krumbein and Sloss, *Stratigraphy and Sedimentation*, 2nd edition.

*Prerequisite:* Geology 67.100.

*Day Division:* 1969-70 (lectures two hours a week, laboratory three hours a week).

K. Hooper and R. W. Yole

### Geology 67.284\* Structure and Geophysics I

Basic field techniques, geological reports, joints, faults, folds and introductory geophysics. With a mandatory 14-day field camp in the spring.

*Texts:* Billings, *Structural Geology* 2nd edition.

Compton, *Manual of Field Geology*.

*Reference Texts:* Holmes, *Principles of Physical Geology*.

Miller, *Photogeology*.

Lattman and Ray, *Aerial Photographs in Field Geology*.

*Prerequisite:* Geology 67.100.

*Day Division:* 1969-70 (lectures two hours a week, laboratory three hours a week, second term).

P. A. Hill

### Geology 67.325 (350, 480, 420 in part) Mineralogy and Petrology

(May be taken as **67.323\*** Geochemistry or **67.324\*** Mineral Deposits for half course credit by non-Geology majors)

Geochemistry and Mineral deposits. A continuation of Geology 67.225, including absolute age-determination techniques, geological application of stable isotope studies, geochemical behaviour and properties of the elements, chemical evolution of the earth, chemical equilibria in geological processes, genesis of ore deposits, introduction to economic geology, applied geochemistry and groundwater geology. Laboratory: megascopic and microscopic examination of rocks and ore minerals: geochemical and economic geology problems.

*Text:* Park and MacDiarmid, *Ore Deposits*.

*Reference Texts:* Garrels and Christ, *Solutions, Minerals and Equilibria*.

Mason, *Geochemistry*.

McDivitt, *Minerals and Men*.

Bates, *Geology of Industrial Rocks and Minerals*.

*Prerequisites:* Geology 67.221\*, 67.225, Chemistry 65.100.

*Day Division:* 1969-70 (lectures two hours a week, laboratory three hours a week).

G. B. Skippen and W. M. Tupper

### Geology 67.335 (360 in part) Palaeontology and Stratigraphy II

(May be taken as **67.333\*** Palaeontology II or **67.334\*** Stratigraphy II for half course credit by non-Geology majors)

A continuation of Geology 67.235. Ontogeny and phylogeny, species concept, biogeography, paleoecology. Stratigraphic analysis. Sedimentary tectonics. Paleogeography. Intercontinental correlations. Systematic historical geology.

*Texts:* Beerbower, *Search for the Past*, 2nd edition.

Krumbein and Sloss, *Stratigraphy and Sedimentation*, 2nd edition.

*Reference Texts:* Dunbar, *Historical Geology*, 2nd edition.

Woodford, *Historical Geology*.

*Prerequisites:* Geology 67.100, 67.235.

*Day Division:* 1969-70 (lectures two hours a week, laboratory three hours a week).

*K. Hooper and R. W. Yole*

### **Geology 67.385 (310 in part) Structure and Geophysics II**

(May be taken as **67.383\*** Structure and Geophysics II or **67.384\*** Geotectonics for half course credit by non-Geology majors)

Mechanical principles of deformation; primary and secondary structures; structure of the earth; rock magnetism; isostasy; seismology; temperature and pressure regimes; geotectonics; continents and ocean basins; orogenies in space and time.

*Reference Texts:* Badgley, *Structural and Tectonic Principles*.

Hills, *Elements of Structural Geology*.

*Prerequisite:* Geology 67.284\*.

*Day Division:* 1969-70 (lectures two hours a week, laboratory three hours a week).

*R. L. Brown and P. A. Hill*

### **Geology 45.411\* Geomorphological Aspects of Slope Development**

(Offered as Geography 45.415\*).

### **Geology 45.413\* Geomorphological Techniques**

(Offered as Geography 45.310\*).

### **Geology 45.414\* Models of Geomorphic Activity**

(Offered as Geography 45.311\*).

### **Geology 45.415\* Quaternary Geography**

(Offered as Geography 45.411\*).

### **Geology 45.418\* Engineering Geomorphology**

(Offered as Geography 45.416\*).

### **Geology 67.420 Metallic and Non-metallic Mineral Deposits**

The geology, classification, occurrence and formation of mineral deposits. The phase chemistry of common sulphide and oxide systems, and its application to the study of mineral deposits. Eh-pH controls. Introduction to mining methods, diamond drilling, sampling, ore calculations, mineralography, metallurgy and property valuation.

Geology of non-metallic minerals; structural, industrial and chemical minerals; ceramics and refractories; abrasives; fertilizers; gemstones; the fossil fuels; ground water.

Laboratory includes visits to local mines and industrial mineral laboratories.

*Texts:* Park and MacDiarmid, *Ore Deposits*.

Bates, *Geology of Industrial Rocks and Minerals*.

*Reference Texts:* Bateman, *Economic Mineral Deposits*.

Lindgren, *Mineral Deposits*.

Parks, *Examination and Valuation of Mineral Property*.

*Prerequisites:* Geology 67.310, or 67.385, 67.350 or 67.325.

*Day Division:* 1969-70 (lectures, laboratories and seminars six hours a week).

*W. M. Tupper*

## Geology

### **Geology 67.422\*** Structural Mineralogy of Rock-forming Silicates

Internal symmetry of crystals, space groups and space group symmetry operations, crystal chemistry of rock-forming silicates.

*Reference Texts:* Evans, *An Introduction to Crystal Chemistry*.

Bragg and Claringbull, *Crystal Structure of Minerals*.

Deer, Howie and Zussman, *Rock-forming Minerals*.

*Prerequisite:* Geology 67.225 or 67.220.

*Day Division:* 1969-70 (lectures two hours a week, laboratory and seminars four hours a week, second term).

G. Y. Chao

### **Geology 67.432\*** Micropalaeontology

Introduction to microfossils. Kinds of microfossils, their historical sequence and bio-stratigraphic significance. Micropalaeoecology. Local and regional correlation. Laboratory: examination and identification of microfossils.

*Text:* To be announced.

*Reference Texts:* Cushman, *Foraminifera*.

Glaessner, *Principles of Micropalaeontology*.

*Prerequisite:* Geology 67.230 or 67.235.

*Day Division:* 1969-70 (lectures and laboratories five hours a week; assignments to be arranged, second term).

K. Hooper

### **Geology 67.451\* (67.452\*)** Igneous and Metamorphic Petrology

Detailed examination of classical problems in petrology. Principles of phase equilibria and graphical representation of mineral systems. Laboratory: the study of igneous and metamorphic suites, introduction to petrographic calculations, and other advanced laboratory techniques.

*Reference Texts:* Kern and Weisbrod, *Thermodynamics for Geologists*.

Winkler, *Petrogenesis of Metamorphic Rocks*.

Turner and Verhoogen, *Igneous and Metamorphic Petrology*.

*Prerequisites:* Geology 67.350 or 67.325, Chemistry 65.210.

*Day Division:* 1969-70 (seminars and laboratory six hours a week, first term).

J. M. Moore

### **Geology 67.461\*** Precambrian Geology

Introduction to problems of the Precambrian, emphasizing both classical and current North American studies. Laboratory: research methods; field trips: petrologic studies of representative rock suites.

*Reference Texts:* To be announced.

*Prerequisite:* Geology 67.325.

*Day Division:* Will be offered in 1970-71.

J. A. Donaldson

### **Geology 67.462\* (67.463\*)** Sedimentology

Review of sedimentary processes. Composition, texture, primary structure and origin of the major sedimentary rock types. Dispersal patterns, sedimentary trends, and lithofacies. Laboratory: textural analyses, heavy minerals, statistical analysis of data, and thin-section petrography.

*Text:* Pettijohn, *Sedimentary Rocks*, 2nd edition.

*Reference Texts:* Krumbein and Pettijohn, *Manual of Sedimentary Petrography*.

Milner, *Sedimentary Petrography*.

*Prerequisite:* Geology 67.350 or 67.325.

*Day Division:* 1969-70 (lectures and laboratory five hours a week, second term).

*J. A. Donaldson*

### **Geology 67.480** Physics and Chemistry of the Earth

Physical and chemical properties and characteristics of the earth. Inferred physico-chemical processes active throughout geologic time.

*Text:* Jacobs, Russell, and Wilson, *Physics and Geology*.

*Reference Texts:* Garrels and Christ, *Solutions, Minerals and Equilibria*.

Mason, *Principles of Geochemistry*.

*Prerequisites:* Chemistry 65.100, Mathematics 69.100 or 69.101, Physics 75.100 or 75.105, Geology 67.350 or 67.325.

*Day Division:* 1969-70 (lectures three hours a week, second term).

*Evening Division:* 1969-70 (lectures three hours a week, first term).

*E. Irving, G. B. Skippen and others*

### **Geology 67.483\*** Applied Geochemistry

Chemical and physical factors responsible for the distribution and migrations of the elements in the lithosphere, hydrosphere, atmosphere and biosphere; geochemistry applied to mineral exploration; methods of analysis. Laboratory: determination of trace amounts of the common metallic elements in soils and stream sediments: case histories; research problems, field trips.

*Text:* Hawkes and Webb, *Geochemistry in Mineral Exploration*.

*Reference Text:* Ginzburg, *Principles of Geochemical Prospecting*.

*Prerequisites:* Geology 67.100, 67.225 (may be taken concurrently), or 67.220, Chemistry 65.100.

*Day Division:* 1969-70 (combined lectures and laboratory five hours a week, first term).

*W. M. Tupper*

### **Geology 67.484\*** Exploration Geophysics

An introduction to the fundamental theory and application of geophysics to economic and structural geology. Methods studied are electrical, gravitational, magnetic, radioactive, and seismic. Case history studies integrate the application of the methods.

*Text:* Dobrin, *Introduction to Geophysical Prospecting*, 2nd edition.

*Reference Texts:* Jakosky, *Exploration Geophysics*.

Parasnis, *Principles of Applied Geophysics*.

*Prerequisite:* Physics 75.100, or 75.105, or permission of the instructor.

*Evening Division:* 1969-70 (lectures and laboratory four hours a week, second term).

*P. J. Hood and others*

### **Geology 67.498** Honours Thesis

The B.Sc. thesis is to be based on a nonconfidential problem, undertaken either during the summer under adequate supervision, or during the University year in the Ottawa area under the supervision of the student's adviser. Equivalent to one full course.

### **Graduate Courses**

With the exception of Geology 67.500, most graduate courses are offered in alternate years.

## Geology

### Geology 67.500

Mandatory: A two year seminar course of one hour weekly or semi-monthly. Problems are presented by graduate students, and discussed by graduates and staff.

### Geology 67.505 Mineral Economics

The principles of economics as applied to the mineral industries, and the economic geology of the more significant mineral industries.

*Reference Text:* AIMME, *Economics of the Mineral Industries*.

*Prerequisites:* Geology 67.420, and Economics 43.100, or permission of the instructor.

*Not offered, 1969-70.*

### Geology 67.510 Geotectonics

The architecture of the globe.

*Reference Texts:* To be assigned.

*Prerequisites:* Geology 67.385, 67.325, 67.335.

*Not offered, 1969-70.*

### Geology 67.520 Advanced Mineral Deposits

Theories of ore deposition are examined in detail.

*Text:* Bateman, *Economic Mineral Deposits*.

*Reference Texts:* Bates, *Geology of Industrial Rocks and Minerals*.

AIMME, *Industrial Minerals and Rocks*.

USBM, *Mineral Facts and Problems*.

*Prerequisite:* Geology 67.420.

*Evening Division:* 1969-70 (seminars four hours weekly).

*J. A. Soles*

### Geology 67.525 Advanced Crystallography

Principles and techniques of X-ray crystallography; interpretation of X-ray photographs and application to the study of minerals.

*Reference Text:* Buerger, *X-ray Crystallography*.

*Prerequisite:* Geology 67.221\*, 67.225 or 67.220.

*Day Division:* 1969-70 (lectures and laboratory six hours weekly).

*G. Y. Chao*

### Geology 67.531\*, 67.532\* Advanced Palaeontology

The morphology, classification, palaeoecology and geological history of one or more invertebrate fossil groups. Normally the course consists of *either*, (1) Foraminifera (Geology 67.531\*) or Ostracoda (Geology 67.532\*) or both, *or* (2) other invertebrate groups, mainly macrofossil.

*Reference Texts:* To be announced.

*Prerequisite:* Geology 67.230 or 67.235. Geology 67.432\* may be taken concurrently. Biology 61.360 is recommended.

*Day Division:* 1969-70 (five hours weekly, one or both terms).

*K. Hooper*

### Geology 67.534\* Palynology

The taxonomy of fossil pollen and spores. Field and laboratory techniques. Principles of pollen analysis; interpretation of pollen diagrams. Statistical methods. Application of pollen and spore analysis to geological problems.



*Text:* Faegri & Iversen, *Textbook of Pollen & Spore Analysis*.

*Reference Text:* To be announced.

*Prerequisites:* Geology 67.230 or 67.235, 67.432\* and permission of the instructor.  
Recommended Biology 61.210, 61.440.

*Day Division:* 1969-70 (five hours weekly, second term).

*K. Hooper*

#### **Geology 45.543\* Channel Form and Process**

(Offered as Geography 45.510\*).

#### **Geology 45.544\* Drainage Basin Processes**

(Offered as Geography 45.511\*).

#### **Geology 67.545 Glaciology**

The study of ice and snow, including glacial and periglacial geology, experimental techniques and physical properties of ice and glaciers. (This course is also listed as Geography 45.515).

*Reference Texts:* To be announced.

*Prerequisite:* Permission of the instructor.

*Evening Division:* 1969-70 (lectures three hours a week).

*A. D. Stanley and others*

#### **Geology 45.546\* Periglacial Geomorphology**

(Offered as Geography 45.514\*).

#### **Geology 45.547\* Experimental Geomorphology**

(Offered as Geography 45.512\*).

#### **Geology 67.550 Advanced Petrology**

The physical and chemical principles of igneous and metamorphic phenomena, with special emphasis on phase equilibria.

*Reference Texts:* Levin et al., *Phase Diagrams for Ceramists*.

Korzhinskii, *Physicochemical Basis of the Analysis of the Paragenesis of Minerals*.

Turner and Verhoogen, *Igneous and Metamorphic Petrology*.

*Prerequisites:* Chemistry 65.210, Geology 67.451.

*Day Division:* 1969-70 (seminars and laboratories five hours a week).

*J. M. Moore*

#### **Geology 67.560 Stratigraphy and Sedimentology**

Selected problems in sedimentary geology. The application of modern techniques of stratigraphic, petrologic and statistical analysis.

*Reference Texts:* Weller, *Stratigraphic Principles and Practice*.

Krumbein and Sloss, *Stratigraphy and Sedimentation*.

Potter and Pettijohn, *Paleocurrents and Basin Analysis*.

*Prerequisites:* Geology 67.235, 67.325, 67.335, 67.462\*.

*Day Division:* 1969-70 (seminars and laboratory five hours a week).

*R. W. Yole*

#### **Geology 67.572\* Instrumental Analysis**

The theory and techniques of instrumental methods of analysis as they apply to problems in the earth sciences. Atomic and molecular absorption spectroscopy, emission spectroscopy, X-ray methods, mass-spectroscopy (part of Chemistry 65.431\* and comprising two thirds of course), silicate analysis, electron probe and other

## Geology

methods of specific interest. (Offered in part in the Department of Chemistry as Chemistry 65.431\*).

*Texts:* Willard, Merritt and Dean, *Instrumental Methods of Analysis*.

Smales and Wager, *Methods in Geochemistry*.

*Reference Texts:* To be announced.

*Prerequisites:* Chemistry 65.250 and permission of the instructors.

*Day Division:* 1969-70 (lectures, seminars, and laboratory five hours a week, second term).

*G. B. Skippen, W. M. Tupper*

### **Geology 67.580** Advanced Inorganic Geochemistry

The geochemical classification of the elements; abundance of the elements; periodic table; bonding; hydrolysis; complex ions; colloids; oxidation-reduction; metamorphism; diffusion; isotopes; metallic mineral deposits.

*Reference Texts:* To be announced.

*Prerequisites:* Geology 67.420; Chemistry 65.250, and preferably 65.350.

*Not offered, 1969-70.*

### **Geology 67.583\*** Physics of the Earth

The gravity, seismology, geomagnetism, and physics of the earth's interior.

*Reference Texts:* To be announced.

*Prerequisites:* Geology 67.350 or 67.325, Mathematics 69.100 or 69.101, Physics 75.100 or 75.105.

*Evening Division:* 1969-70 (lectures three hours a week, first term).

*E. Irving*

### **Geology 67.584\*** Chemistry of the Earth

The material in Geology 67.480 at a more advanced level. The basic principles of chemistry as they apply to problems in geochemistry. The chemistry and genesis of igneous, metamorphic and sedimentary rocks. The geochemistry and evolution of the hydrosphere, atmosphere and biosphere. The geochemical cycle.

*Reference Texts:* Mason, *Principles of Geochemistry*.

Garrels and Christ, *Solutions, Minerals & Equilibria*.

*Prerequisites:* Geology 67.325 and preferably Chemistry 65.350.

*Day Division:* 1969-70 (lectures three hours a week, second term).

*G. B. Skippen*

### **Geology 67.585** Physical Geochemistry

Application of thermodynamics to geologic problems. Experimental study of mineral equilibria.

*Prerequisites:* Chemistry 65.210, Geology 67.451\*.

*Not offered, 1969-70.*

### **Geology 67.590** Directed Studies

Directed reading or directed laboratory studies in fields closely related to the graduate student's thesis problem, under the guidance of selected extramural or intramural directors.

### **Geology 67.599** M.Sc. Thesis

Equivalent to two full courses.

### **Geology 67.699** Ph.D. Thesis

Equivalent to five full courses.

# German

Professor; Chairman of  
Department

Associate Professors

Assistant Professors

Assistant Professor of

Comparative Literature

Sessional Lecturers

E. M. Oppenheimer

Jutta Goheen, B. Mogridge

R. D. Gould, Anna M. Rosenberg, H.-H. Schmidt

H.-G. Ruprecht

Martha Camfield, Almut Chateau, Trudy Kassner,

Annegret Koch, Agatha Rueter, Regine Schmidt,

Hildegard Webber

*Courses open to First-Year students:* 22.015 or 22.016 (see course descriptions); 22.100 or 22.101 (choice made in consultation with department); 22.201\* and 22.202\*; 22.250 or 22.281 (by special dispensation).

## Major in German

A minimum of five courses (beyond German 22.015); in addition to German 22.100 these normally include German 22.250 and at least one of the composition-conversation series. It is possible to elect German and another subject for a combined major program. Early consultation with the departments concerned is advised.

## Honours Courses

a) *Honours in German.* Completion of nine courses in German (including German 22.100 or equivalent) is required. They are chosen with due regard to the student's interests and needs and will include work in composition and conversation. An Honours Essay for one course credit is optional.

b) *Combined Honours.*

The following honours programs are offered: German and Russian (p. 303), German and English (p. 162), German and French (p. 174). This last combination fulfills the certificate requirements of the Ontario College of Education, with emphasis on all periods of modern German literature and regular opportunity for oral and written practice throughout the program; other possible and suitable combinations include Philosophy, Music, Art and History. All programs, including combinations which may be proposed to the departments concerned for approval, are designed to serve as a basis for further work in German at the graduate level. In this latter case the student is advised to elect German 22.430. Ordinarily seven course credits in each of the two subjects are required. Provision may be made in the final year for independent study in a particular field of concentration. Regulations governing honours standing are found on pp. 13 and 26.

*Language Laboratory facilities* are used in German 22.015 and 22.100.

Students are urged to use the reading and conversation room in Paterson Hall.

## Graduate Studies

The department offers an M.A. program in German with the following areas of study:

German 22.530/531\* Literary Theory

German 22.540/541\* Genres in German Literature

German 22.550/551\* Prevalent Themes in German Literature

German 22.560/561\* Period Studies

German 22.570/571\* Individual Author

German 22.580/581\* Linguistic Problems

## German

Each year half or full courses will be offered in some of these fields. Fourth year courses are open to graduate students on approval by the department. Students may also select courses from the Comparative Literature program which include the study of German texts (program described on p. 47).

General regulations for graduate studies are found on pp. 67-69. The student for the M.A. in German normally takes a minimum of three courses, plus a thesis, or five courses without a thesis and will also sit for a comprehensive examination. Further information on requirements can be obtained from the department.

### **German 22.015, Elementary German**

An introduction to the essentials of German grammar and composition; oral practice. Attendance at classes and laboratory sessions is compulsory. Guidance in the reading of scientific texts is available.

*Day and Evening Divisions:* Annually (four hours, including one laboratory period a week).

*Summer Session:* 1969 *Day Division* (ten hours a week); *Evening Division* (five hours a week).

*Members of the Department*

### **German 22.016, Deutsch I**

A direct method course for beginners, instruction in German with extensive use of audio-visual aids.

*Day and Evening Divisions:* Annually (four hours a week, students will be required to use the practice laboratory for assignments).

*Members of the Department*

### **German 22.100 Intermediate German A**

Extensive review and practice in written and spoken German. Readings from German literature.

*Prerequisite:* Grade 11 or 12, German 22.015 or 22.016, or equivalent.

*Day and Evening Divisions:* Annually (four hours a week, including one laboratory period a week).

*Members of the Department*

### **German 22.101 Intermediate German B**

German literature: representative texts from 18th, 19th and 20th centuries, including plays by Goethe, Brecht or Dürrenmatt. Practice in written and spoken German.

*Prerequisite:* Good standing in Grade 13, or German 22.015 or 22.016, or equivalent.

*Day Division:* Annually (four hours a week, including one laboratory or discussion period a week).

*Members of the Department*

### **German 22.201\* Intermediate Conversation**

Work in small groups with special emphasis on every-day German.

*Prerequisite:* Permission of instructor. (May be taken concurrently with German 22.100).

*Day and Evening Divisions:* 1969-70 (two hours a week, both terms).

*H.-H. Schmidt*

### **German 22.202\* Intermediate Composition**

Expansion of the active vocabulary within the framework of current prose usage.

*Prerequisite:* German 22.100 or permission.

*Day and Evening Divisions:* 1969-70 (two hours a week, both terms).  
*R. D. Gould*

**German 22.250** German Literature of the 18th Century

The literature of Enlightenment, Storm and Stress, and Early Classicism, with special emphasis on the works of Lessing, Goethe and Schiller.

*Prerequisite:* German 22.100 or equivalent.

*Day or Evening Division:* 1969-70 (three hours a week).

*H.-H. Schmidt*

**German 22.281 (22.280)** German Poetry and Drama of the 20th Century

*Prerequisite:* German 22.100, 22.101, or equivalent.

*Day Division:* 1969-70 (three hours a week).

*B. Mogridge*

**German 22.282 (22.280)** German Prose Fiction of the 20th Century

*Prerequisite:* German 22.100, 22.101, or equivalent.

*Not offered, 1969-70.*

**German 22.301\*** Advanced Conversation

Work in small groups with special emphasis on idiomatic German. Survey of phonetics. Discussion of current issues. Production of a (radio) play.

*Prerequisite:* German 22.201\* or permission.

*Day or Evening Division:* 1969-70 (two hours a week, both terms).

*H.-H. Schmidt*

**German 22.302\*** Advanced Composition

Flexibility in the use of German; composition and exercises.

*Prerequisite:* German 22.202\* or permission.

*Day or Evening Division:* 1969-70 (two hours a week, both terms).

*H.-G. Ruprecht*

**German 22.312** German Prose; Stylistics and Composition

Analysis of selected prose with practical exercises in prose writing. Elements of period style in the prose of Romanticism; elements of personal style in writing of Kleist, Keller, Mann, Rilke.

*Text:* H. Brinkmann, *Die deutsche Sprache*.

*Day Division:* 1969-70 (three hours a week).

*Jutta Goheen*

**German 22.341\*** Early Modern German Literature (1500-1700)

This course covers study of selected literary texts of the period.

*Prerequisite:* German 22.250 or permission.

*Day Division:* 1969-70 (two hours a week).

*H.-G. Ruprecht*

**German 22.370** German Literature of the 19th Century

An examination of the literature of "Biedermeierzeit" and Poetic Realism.

*Not offered, 1969-70.*



## German

### German 22.410\* History of the German Language I

The formation and early periods of the German language will be discussed in the light of the nature, specific forms and implications of phonetic change, cultural development and literary sources.

*Texts:* E. H. Sturtevant, *Linguistic Change*.

H. Eggers, *Deutsche Sprachgeschichte I & II*.

*Not offered, 1969-70.*

### German 22.411\* History of the German Language II

The development of New High German from Luther to the twentieth century: vocabulary and stylistic trends in literature.

*Text:* A. Bach, *Geschichte der deutschen Sprache*.

*Not offered, 1969-70.*

### German 22.430 Medieval Language and Literature

Detailed linguistic and stylistic examination of representative examples of Minnesang and of the popular and courtly epic.

*Day Division:* 1969-70 (three hours a week).

*Jutta Goheen*

### German 22.451\* Goethe's writings: 1812-1832 (I)

### German 22.452\* Goethe's writings: 1812-1832 (II)

The principal objects of detailed examination will be *Wilhelm Meisters Wanderjahre*, *West-östlicher Divan* and *Faust II*. Goethe's critical, scientific and occasional writings of the period will also be considered.

*Evening Division:* 1969-70 ((22.451\*) two hours a week, first term).

*Day or Evening Division:* 1969-70 ((22.452\*) two hours a week, second term).

*E. M. Oppenheimer*

### German 22.460 Romanticism

The intellectual and cultural foundations of German Romanticism and its principal literary manifestations in the lyric, the drama and the novel.

*Prerequisite:* German 22.250 or permission.

*Day Division:* 1969-70 (three hours a week).

*R. D. Gould*

### German 22.490\* Tutorial on selected topic

Primarily for honours students in their final year. A genre, an author or a group of authors will be selected; methods of literary criticism are considered.

*Day Division:* 1969-70 (hours to be arranged).

*Members of the Department*

### German 22.491 Tutorial

As above, but offered for full-course credit with a corresponding enlargement of scope and assignments.

### German 22.499 Honours Essay

An option for final-year honours students.

**German 22.540** Genres in German Literature

The structure of the Novel: Structural Theory; application to 20th century novels (Mann, Rilke, Kafka).

*Day Division:* 1969-70 (three hours a week).

*Jutta Goheen*

**German 22.561 \*** Period Studies

The short story as a twentieth-century paradigm social and literary framework; styles, structures modes, concerns; analysis of representative texts.

*Day or Evening Division:* 1969-70 (lectures and discussion two hours a week, first term).

*B. Mogridge*

**German 22.571 \*** Individual Authors

Heinrich Heine, poet and journalist.

*Day or Evening Division:* 1969-70 (lectures and discussion two hours a week, second term).

*B. Mogridge*

**German 22.590** Special Topic**German 22.599** M. A. Thesis (and colloquium)

Attention is directed to the Comparative Literature program (p. 47).

\*An asterisk attached to a course number indicates a half course.



# History

Professor; Chairman of  
the Department  
Professors

Stanley R. Mealing  
Desmond G. Bowen, Gordon S. Couse,  
David M. L. Farr (on leave of absence, 1969-70),  
Richard G. Glover, H. Blair Neatby, Fernand Ouellet,  
Michael J. Sydenham

Associate Professors

John G. Bellamy, Karel D. Bicha (on leave of absence,  
1969-70), B. Carman Bickerton, G. Peter Browne,  
R. Carter Elwood, Michael G. Fry (on leave of  
absence, 1969-70), Robert B. Goheen,  
T. Murray Hunter, Peter J. King, Vaclav Mudroch (on  
leave of absence, 1969-70), John W. Strong (on leave of  
absence, 1969-70)

Assistant Professors

Marilyn J. Barber, Richard T. Clippingdale,  
J. Nicoll Cooper, Grover F. Goodwin,  
Naomi E. S. Griffiths, Edward R. Kantowicz,  
Dale T. LaBelle, Roger E. Reynolds, Norman M. Willis  
Sessional Lecturers  
Douglas A. Argue, Clifford J. Berschneider,  
Jaroslav A. Boucek, Ross A. Eaman,  
Donald J. Goodspeed, James R. Miller,  
Delphin A. Muise

Research Adviser

Sydney F. Wise

## Programs of Study

Every student who elects History as a major or honours subject, or who undertakes graduate work in History, will plan the whole of his program in consultation with a departmental program adviser, whose approval is necessary each year before registration is complete. Departmental advisers for students entering the following stages of History programs are:

First-year major students	J. G. Bellamy
Second-year major students	T. M. Hunter
Third-year major students	N. M. Willis
Third-year honours students	G. P. Browne
Fourth-year honours students	M. J. Sydenham
Graduate students	H. B. Neatby

Students registered at the Rideau River Campus are reminded that courses taught at St. Patrick's College are open to them, and are listed separately in the College calendar. Inquiries may be made of J. K. Johnson, St. Patrick's College.

## Major in History (Three Years)

1. Students majoring in History are to take a minimum of six History courses, as follows:

- a) one 100-level course, to be taken in the first year;
- b) three 200-level courses, at least two of which are to be taken in the second year;
- c) two 300-level courses, to be taken in the third year. The prerequisite for any 300-level course is *either* two 200-level courses, one of them in an appropriate area from the list in paragraph 2, below, *or* permission of the Department.

## History

2. Of the five courses required at the 200 and 300 levels, not more than two may fall entirely within the history of one country; and among them at least one course must be included in each of three of the following fields:

- a) Medieval and early modern Europe;
- b) Modern Western Europe;
- c) Russia and Eastern Europe;
- d) Great Britain and the Commonwealth;
- e) North America.

In order to continue in the major program, a student must attain a grade of C— or better in a first-year History course and must maintain at least that average over all the History courses he has taken.

### *Combined Majors*

For major programs combining History with another subject, the general rule is that they must include at least four courses in History, at least one of them at the 300 level.

### **Honours in History (Four Years)**

1. The honours program consists of nine or ten courses in History, as follows:

- a) one 100-level course, to be taken as part of the first year;
- b) two 200-level courses, to be taken in the second year;
- c) three 300-level courses, to be taken in the third year and to include History 24.388;
- d) three or four 400-level courses, to be taken in the fourth year and to include a comprehensive examination (History 24.490). The prerequisite for any 400-level course is *either* two 300-level courses, one of them or another history course being in an appropriate area, *or* permission of the Department.

2. Honours students in the fourth year will take four courses altogether, all at the 400 level, one of which may be outside the Department. Not more than two 400-level courses in History may be taken in any one of the five areas listed above. A student may elect to present a research essay (History 24.499) in place of any two other 400 courses except History 24.490. Students will be required to show a proficient reading knowledge of at least one language other than English, the choice ordinarily to depend upon the field offered on the comprehensive examination.

Students intending to enter the honours program are advised to do so as early as their intentions are settled, and not later than the beginning of the third year. Honours students in good standing, whose course pattern meets the regulation in paragraph 2. of the section *Major in History*, may revert to the pass program with a B.A. at the end of the third year. To enter or to continue in the honours program, a student must attain a grade of C— or better in a first-year History course and must maintain at least that average in the History courses he has taken. In determining the class of an honours candidate's degree, the Department will average his grades on all History courses, those on 400 courses being given double weight.

For information about preparation to enter the Ontario College of Education, and the requirements for the Interim High School Assistant's Certificate, Type A, students are advised to consult the Registrar.

### *Combined Honours*

For honours programs combining History with another subject, the general rule is that they must include at least six courses in History. History 24.490 must be included, unless the equivalent is offered in the other department.



## Graduate Studies

The Department offers work leading to the degree of Master of Arts in History in fields for which adequate source materials are available in Ottawa. Candidates entering the M.A. program must have an Honours degree in History or its equivalent in both content and standing. Candidates holding a Pass degree and with no further training will be considered as applying for admission to the Fourth year of the Honours B.A. in history.

For general regulations concerning admission, standing, time limitation and theses, see pp. 67-69.

M.A. candidates will undertake the following course of study:

1. History 24.588 (The Historiography of North America).
2. History 24.590 (supervised study for a field examination).
3. *Either*: History 24.599 (Thesis and seminar participation).

*Or*: a) History 24.530 (The Canadas, 1784-1867) or History 24.533 (Canada since 1867) and

- b) a second seminar in the Department or a seminar, approved by the Department, in a related field.

Candidates will also be required to show a reading knowledge of a language other than English, the choice to depend on the field of the candidate's thesis or research.

### *Details of Courses: Qualifying Year*

#### **History 24.014** The Origins of North American Society

An examination of the manner and extent to which institutions and social structures transplanted from Europe developed new patterns from the seventeenth to the nineteenth centuries and became characteristically North American.

*Day Division*: 1969-70 (three hours a week).

*B. C. Bickerton*

### *Details of Courses: First Year*

#### **History 24.112** European Civilization in Modern Times

A survey of European history from the mid-seventeenth century to the First World War.

*Day Division*: 1969-70 (three hours a week).

*R. G. Glover*

*Evening Division*: 1969-70 (three hours a week).

*D. A. Argue*

#### **History 24.115** Civilization during the Middle Ages

This course will discuss the development of the civilization which characterized the West from the decline of the Roman Empire until the Renaissance. Students who elect History as their major or honours subject are required to take either this course or History 24.112.

*Day Division*: 1969-70 (three hours a week).

*J. G. Bellamy*

*Summer*: 1969 *Day Division* (ten hours a week).

*C. J. Berschneider*

## History

### *Details of Courses: Second Year*

#### **History 24.211** Cultural and Intellectual History of the Middle Ages

Commencing with a study of patristic thought and institutions, this course will examine the intellectual and cultural development of medieval Europe.

*Day Division:* 1969-70 (three hours a week).

*R. E. Reynolds*

#### **History 24.215** Western Europe from the Renaissance to the Eighteenth Century

A consideration of aspects of Western European development in the early modern period.

*Not offered, 1969-70.*

#### **History 24.230** Canada from 1763

The political, economic and social development of the British North American colonies of 1763 to the Canada of today.

*Day and Evening Divisions:* Annually (three hours a week).

*R. T. Clippingdale, S. R. Mealing, H. B. Neatby and F. Ouellet*

*Summer:* 1969 *Day Division* (ten hours a week).

*J. R. Miller*

#### **History 24.240** History of the United States of America

This course will consider the history of the United States in the national period, emphasizing political and economic factors.

*Day Division:* 1969-70 (three hours a week).

*E. R. Kantowicz and P. J. King*

#### **History 24.256** Comparative History of Great Britain and France

A comparative study of political and social developments in the two major countries of Western Europe, from the later middle ages to the nineteenth century.

*Day Division:* 1969-70 (three hours a week).

*J. N. Cooper and N. E. S. Griffiths*

#### **History 24.260** History of Russia and the U.S.S.R.

A survey of Russian history from Kiev to the present, with emphasis on the period since the reign of Peter the Great.

*Day Division:* 1969-70 (three hours a week).

*R. C. Elwood*

*Summer:* 1969 *Day Division* (ten hours a week).

*J. W. Strong*

#### **History 24.280** The Great Powers, 1789-1890

A study of international relations from the beginning of the French Revolution to the fall of Bismarck.

*Day Division:* 1969-70 (three hours a week).

*T. M. Hunter*

#### **History 13.290** Greece in the Ancient World

(Offered in the Department of Classics as Classical Civilization 13.290).

#### **History 13.291** Rome in the Ancient World

(Offered in the Department of Classics as Classical Civilization 13.291).

*Details of Courses: Third Year*

The prerequisite for any 300-level course is *either* two 200-level courses, one of them in an appropriate area from the list in paragraph 2, page 212, *or* permission of the Department.

**History 24.310 Problems in the History of Ideas**

A study of historical problems associated with selected intellectual movements, such as humanism, theocracy, modern scientific thought, romanticism and contemporary ideologies.

*Day Division:* 1969-70 (three hours a week).

*D. G. Bowen*

**History 24.311 Medieval Institutions**

A course investigating the difficulties and achievements involved in, and the ideas behind, some medieval religious, political and legal institutions.

*Day Division:* 1969-70 (three hours a week).

*J. G. Bellamy and R. E. Reynolds*

**History 24.314 Church, State and Society from the Reformation to the Present**

A study of Christian thought and institutions and their influence on the appearance of nation states and on the growth of modern pluralistic society in Europe and America.

*Day Division:* 1969-70 (three hours a week).

*D. G. Bowen*

**History 43.315 European Economic History**

(Offered in the Department of Economics as Economics 43.315).

**History 24.316 Liberty and Authority in Modern France**

Studies in French history since 1789, with particular reference to the development of a political tradition. The ability to read French is desirable.

*Day Division:* 1969-70 (three hours a week).

*M. J. Sydenham*

*Summer:* 1969 *Evening Division* (five hours a week).

*N. E. S. Griffiths*

**History 24.318 German Unity and Nationality**

Studies in the development of a political identity in the German world since 1806, including the influence of nationalism on German politics.

*Day Division:* 1969-70 (three hours a week).

*N. M. Willis*

*Summer:* 1969 *Day Division* (ten hours a week).

*N. M. Willis*

**History 43.325 The Economic Development of Canada**

(Offered in the Department of Economics as Economics 43.325).

**History 24.331 French Canada since Confederation**

A political and intellectual history of French Canada with emphasis on the development of French Canadian nationalism. Students will be expected to read both French and English sources.

*Day Division:* 1969-70 (three hours a week).

*H. B. Neatby*

## History

### **History 24.334** Canada-United States Relations

An examination of Canadian-American relations from the end of the eighteenth century, with particular attention to the period since 1871.

*Evening Division:* 1969-70 (three hours a week).

*D. A. Muise*

### **History 24.335** Studies in the History of Colonial North America

A course which will consider selected aspects of British, French and Spanish colonial enterprise in North America, in the period ending with the American Revolution.

*Day Division:* 1969-70 (three hours a week).

*G. P. Browne*

### **History 24.340** The United States in the Twentieth Century

A course whose main emphasis will fall on issues in the domestic politics of the United States in the first half of the twentieth century.

*Day Division:* 1969-70 (three hours a week).

*E. R. Kantowicz*

### **History 24.348** American Intellectual History

An examination of American thought from the colonial period to the twentieth century, with emphasis on political, social and religious ideas and their relation to American society and institutions.

*Day Division:* 1969-70 (three hours a week).

*P. J. King*

### **History 24.350** British Constitutional History

A survey of the development of the British constitution from its Anglo-Saxon beginnings.

*Evening Division:* 1969-70 (three hours a week).

*G. P. Browne and R. B. Goheen*

### **History 24.358** British History from 1714

This course will centre on the political and social development of Great Britain in the nineteenth century.

*Day Division:* 1969-70 (three hours a week).

*R. G. Glover*

### **History 24.360** History of the U.S.S.R.

A political and intellectual history of Soviet Russia from 1917 to present.

*Day Division:* 1969-70 (three hours a week).

*D. T. Labelle*

### **History 24.365** History of Eastern Europe

A survey of Eastern European history from the early nineteenth century to the present with emphasis on the histories of Poland, Czechoslovakia and Hungary.

*Evening Division:* 1969-70 (three hours a week).

*J. A. Boucek*

**History 24.370** British Expansion Overseas and the British Empire

This course will consider the development of the British Empire and Commonwealth from the American Revolution to the present day.

*Day Division:* 1969-70 (three hours a week).

*G. P. Browne*

**History 24.380** Diplomacy of the Great Powers, 1890-1945

The relations of the great powers in the years before 1916; wartime diplomacy and the peacemaking of 1919-23; inter-war diplomacy and the origins of the Second World War; and the relations of the powers 1939-45.

*Evening Division:* 1969-70 (three hours a week).

*D. J. Goodspeed*

**History 24.388** The Philosophy of History

A seminar, required of candidates for Honours in History in their third year, in which major historical writings and works in the philosophy of history will be examined.

*Day Division:* 1969-70 (three hours a week).

*G. S. Couse*

*Evening Division:* 1969-70 (three hours a week).

*Ross A. Eaman*

*Details of Courses: Fourth Year*

The prerequisite for any 400-level course is *either* two 300-level courses, one of them or another history course being in an appropriate area, or permission of the Department.

**History 24.411** Later Medieval Britain and France

A seminar on selected problems in French and British history from the twelfth to the fifteenth centuries.

*Day Division:* 1969-70 (three hours a week).

*J. G. Bellamy*

**History 24.416** The French Revolution

A seminar on selected problems in the history and interpretation of the French Revolution, with particular attention to the development of democracy. Students will be expected to read both French and English sources.

*Day Division:* 1969-70 (three hours a week).

*M. J. Sydenham*

**History 13.429** Selected Problems in Greek and Roman History

(Offered in the Department of Classics as Classical Civilization 13.429).

**History 24.430** Selected Problems in The Social and Economic History of Pre-Confederation Canada

A seminar on the social and economic changes underlying political evolution from the rebellions of 1837 to Confederation.

*Day Division:* 1969-70 (three hours a week).

*J. K. Johnson and F. Ouellet*



## History

### **History 24.431** New France

A seminar in which selected topics in French colonial policy and the development of New France will be examined.

*Day Division:* 1969-70 (three hours a week).

*B. C. Bickerton*

### **History 24.433** Selected Problems in the Social and Political Development of Twentieth-Century Canada

A seminar on problems arising from the impact on Canadian society of rapid immigration, the two world wars and the great depression.

*Day and Evening Divisions:* 1969-70 (three hours a week).

*M. J. Barber*

### **History 24.440** Movements of Reform in the United States

A seminar concentrating upon selected aspects of the history of reforming movements in American life and politics since 1870.

*Not offered, 1969-70.*

### **History 24.441** Selected Problems in Twentieth-Century United States Politics

A seminar on selected problems in United States politics since the end of the First World War.

*Day Division:* 1969-70 (three hours a week).

*G. F. Goodwin*

### **History 24.457** Selected Problems in Tudor and Stuart History

A seminar on problems selected from the history of English development from the accession of the Tudor dynasty to the rejection of the Stuarts.

*Day Division:* 1969-70 (three hours a week).

*R. B. Goheen*

### **History 24.458** Selected Problems in Nineteenth-Century British History

A seminar which will examine certain problems in nineteenth-century British society politics and religion in the light of existing sources.

*Day Division:* 1969-70 (three hours a week).

*J. N. Cooper*

### **History 24.460** Selected Problems in Russian History

A seminar in which extensive reading and research will be undertaken on a selected problem relating to the expansion and decline of Imperial Russia.

*Day Division:* 1969-70 (three hours a week).

*D. T. LaBelle*

### **History 24.461** Selected Problems in Soviet History

A seminar in which extensive reading and research will be undertaken on selected problems relating to the establishment and subsequent course of the Soviet Union.

*Day Division:* 1969-70 (three hours a week).

*R. C. Elwood*

### **History 24.480** Selected Problems in the Diplomacy of the Great Powers, 1906-1939

A seminar on selected problems in diplomatic history from the origins of the First World War.

*Not offered, 1969-70.*

**History 24.481** Diplomatic and Strategic Problems of the Second World War

A seminar on problems selected from major politico-strategic issues of the outbreak, conduct and aftermath of the Second World War.

*Day Division:* 1969-70 (three hours a week).

*T. M. Hunter*

**History 24.490** Honours Comprehensive

Required of candidates for Honours in History in their fourth year. Supervised reading in a special field and in general questions relating to historical thought, in preparation for a written comprehensive examination.

*Day Division:* Annually.

*Members of the Department*

**History 24.499** Honours Research Essay

Open to candidates for Honours in History in their fourth year. The subject for research will be settled in consultation with the Department and a supervisor will be assigned. The candidate will be orally examined upon his essay after presentation.

*Day Division:* Annually.

*Members of the Department*

**Graduate Courses****History 24.530** The Social and Economic History of the Canadas, 1784-1850

A seminar primarily for graduate students in History.

*Evening Division:* 1969-70 (three hours a week).

*F. Ouellet and S. F. Wise*

**History 24.533** Post-Confederation Canada

A seminar primarily for graduate students in History.

*Day Division:* 1969-70 (three hours a week).

*R. T. Clippingdale and H. B. Neatby*

**History 24.588** The Historiography of North America

A course, primarily for graduate students in History, in which the trends and methods of historical writing on North America will be examined.

*Day Division:* 1969-70 (three hours a week).

*P. J. King and S. R. Mealing*

**History 24.590** Tutorial -Graduate Studies

Supervised study in a specified field, in preparation for a written examination.

*Day and Evening Divisions:* Annually.

*Members of the Department*

**History 24.599** Thesis-Graduate Studies

A substantial historical investigation. The subject will be settled in consultation with the Department and a supervisor will be assigned. The candidate will be orally examined after presenting his thesis.

*Day and Evening Divisions:* Annually.

*Members of the Department*



# Italian

Associate Professor;  
Chairman of the  
Department  
Assistant Professor  
Sessional Lecturer

C. A. Marsden  
Claudia Persi Haines  
To be announced

Since 1966-67 a limited range of courses has been offered in Italian. The program will be expanded as the need is manifested.

## **Italian 26.015** Introduction to Italian

A beginning course designed to give the student the fundamentals of written and spoken Italian. Grammar, reading and oral practice.

Bosco-Lolli: *Incontro con l'Italiano*

*Day and Evening Divisions:* Annually (lectures and laboratory four hours a week).

*Claudia Persi Haines*

## **Italian 26.100** Intermediate Italian

A course intended to consolidate and supplement knowledge of the language and culture acquired in Italian 26.015. Reading of literary texts, composition and oral practice.

*Text:* To be announced.

*Prerequisite:* Italian 26.015 or equivalent.

*Day Division:* 1969-70 (three hours a week).

*Claudia Persi Haines*

## **Italian 26.201\*** Italian Conversation

Conversation and discussion of general and current problems, including occasional written work.

*Prerequisite:* Italian 26.100 or permission of the Department.

*Texts:* To be decided.

*Evening Division:* 1969-70 (two hours a week throughout the year).

## **Italian 26.202\*** Italian Composition

A course designed to utilize the achievements attained in Italian 26.100, particularly with the view of enabling students to write fluently in Italian.

*Prerequisite:* Italian 26.100 or permission of the Department.

*Texts:* To be decided.

*Evening Division:* 1969-70 (two hours a week throughout the year).

## **Italian 26.220** Italian Literature of the Middle Ages

An examination of Italian literature from the earliest works in the vernacular to the beginning of the 15th Century, with particular reference to Dante, Boccaccio and Petrarch.

*Prerequisite:* Italian 26.100 or permission of the Department.

*Day Division:* 1969-70 (three hours a week).

*Claudia Persi Haines*

## **Italian 26.230** Modern Italian Literature

A survey of Italian Literature from Manzoni to the present day.

*Prerequisite:* Italian 26.100 or permission of the Department.

*Not offered, 1969-70.*





# Journalism

Professor Emeritus	Wilfrid Eggleston
Professor	Melville W. Thistle
Associate Professor;	
Director of the School	T. Joseph Scanlon
Associate Professor	Wilfred H. Kesterton, Brian Taylor
Assistant Professors	Stuart Adam (on leave of absence, 1969-70), Carman Cumming, Joel Weiner, Phyllis Wilson
Special Lecturers	William Drinkwater
Sessional Lecturers	Robert Prinsky, Joan Topolski
Seminar Leaders	Hal Anthony, Nathan Dreskin, Walter B. Herbert, Pierre O'Neil, Helen Wilson
Field Work Supervisors	Ernie Calcutt ( <i>CFRA</i> ), John McLeod ( <i>Ottawa Journal</i> ), Burns Stewart ( <i>Canadian Broadcasting Corporation</i> ), Fred Johnstone ( <i>Ottawa Citizen</i> ), Fraser MacDougall ( <i>Canadian Press</i> )

## Journalism 28.100 Introduction to Mass Communications

A study of how man communicates. Semantics. The role of the mass media in communication. The philosophy and goals of journalism.

*Day Division:* Annually (lecture and seminars three hours a week).

*Mel Thistle and Brian Taylor*

## Journalism 28.101 Journalism Workshop

A non-credit course designed to provide Journalism students with the fundamental skills required in typing, speed writing, copy handling, use of radio and television equipment.

*Prerequisite:* For First year Journalism students only.

*Day Division:* Given once a term for 6-week period.

*Carman Cumming*

## Journalism 28.200 Problems for the Mass Media

A historical and contemporary examination of mass media; problems including: ownership structure, monopoly, government control, freedom and secrecy, responsibility and ethics, public opinion, propaganda, copyright, censorship in war and peace. The law of the press.

*Prerequisite:* Journalism 28.100.

*Day Division:* Annually (three hours a week, starting in 1970-71).

## Journalism 28.210 Introduction to Journalism

A broad survey of the whole field. Opportunities and personal requirements in various branches of the media. A history of journalism, emphasizing as major themes: technological developments, the growth of press freedom and press responsibility, studies of representative journals and journalists, mainly Canadian, British and American. The mass media today.

*Day Division:* Annually until 1969-70 (lectures and practical exercises four hours a week).

*Joel Weiner*

*Summer: 1969 Day Division* (lectures ten hours a week).

*Joel Weiner*

## Journalism

### Journalism 28.220 Fundamentals of Reporting

The nature of news values; how to recognize and collect news; how to analyze, organize and report it. Interviewing and news gathering. This is mainly a practical course, based on assignments in reporting and other forms of writing.

*Day Division:* Annually (lecture and practical exercises, four hours a week).

*Robert Prinsky, T. J. Scanlon, Joan Topolski, Phyllis Wilson*

*Summer:* 1969 *Evening Division* (lectures and assignments averaging seven hours a week).

*Phyllis Wilson*

### Journalism 28.300 The Modern Environment

An interdisciplinary course which will range from the purely descriptive — the nature of the modern community, its problems and beliefs — to the philosophic questions raised by the study of the culture of science.

*Prerequisites:* Journalism 28.100 and Journalism 28.200, or permission of the Department.

*Day Division:* Annually (three hours a week) starting in 1971-72.

### Journalism 28.320 Interpretative Reporting and Edition

The reporting of public affairs. The background story. Interpretation. The role of the editor. The editor and the law. Management problems and policies.

*Prerequisite:* Journalism 28.200.

*Day Division:* Annually (day-long seminar once a week). Starting in 1971-72.

### Journalism 28.321\* Career Seminars

An opportunity for the student to specialize by doing work in television, radio, magazines, public relations, creative writing, editorial writing, freelancing, the film, or reporting in the French language.

*Prerequisite:* For Third year Journalism students only.

*Day Division:* Annually, as required, starting in 1971-72.

### Journalism 28.330 Editing

Copy-reading and head-writing. This course will provide practical instruction in the duties and responsibilities of the deskman, and training in reading copy and writing headlines; the use of illustrations. The responsibilities and opportunities of the editor in his community will be discussed; problems of management; personnel relations; the press and society; semantics; the ethics of journalism; freedom of the press; the law and the press; censorship in war and peace; news policy, the sources and interpretation of foreign news.

*Text:* Bastian, Case, and Baskette, *Editing the Day's News*.

*Prerequisite:* Journalism 28.210.

*Day Division:* Annually (lectures three hours a week).

*W. H. Kesterton*

### Journalism 28.340 Interpretative Journalism

This is mainly a practical course based on community assignments aimed at identifying and interpreting the news. Coverage extends to politics and governmental activity, both civic and federal, and to the specialized fields of international affairs, business, labor, science, sports, the drama, film, music, art and book review. The course includes development of contacts and sources, methods of research, use of a newspaper library and morgue; and work in Ottawa newsrooms.

*Text:* MacDougall, *Interpretative Reporting*.

*Prerequisite:* Journalism 28.220.

*Day Division:* Annually (lectures and practical exercises averaging six or seven hours a week).

*Carman Cumming*

### **Journalism 28.350 Career Seminar in Journalism**

Round table discussions with guest speakers. Each student in Journalism 28.350 will be required to choose a current topic of Canadian interest for extensive live research and study as preparation for an oral report, which will be followed by questioning from instructor and group. Vocational guidance. Groups will be arranged whenever possible to meet the needs of those who have special interests or ambitions.

*Prerequisite:* For final year Journalism students.

*Day Division:* Annually (round table sessions, two hours a week, plus special seminars).

*Mel Thistle and Phyllis Wilson*

### **Journalism 28.400 Basic Issues**

A seminar on leading news topics of the day. Stress will be placed upon intensive investigation and consideration of perennial problems as well as emerging public issues likely to confront the professional journalist.

*Prerequisite:* Journalism 28.300.

*Day Division:* Annually (three hours a week) starting 1971-72.

### **Journalism 28.401\* Perspectives on Modern Society**

A half course for graduate students similar to Journalism 28.300.

*Day Division:* Annually (one and a half hours a week).

*Joel Weiner*

### **Journalism 28.402\* Basic Issues in Canada**

A half course for graduate students similar to Journalism 28.401\*.

*Day Division:* Annually (one and a half hours a week).

*Joel Weiner*

### **Journalism 28.410 The Press in Modern Society**

A brief historical survey of the rise of the press as an influential agency in western society is followed by a more detailed examination of the ownership and control of the press today, and the consequences and implications. Theories of the press. Public opinion. Propaganda. Freedom of the press in Canada and around the world.

*Recommended Reading:* Peterson, Jensen, Rivers, *Mass Media and Modern Society*. Kesterton, *A History of Journalism in Canada*.

*Prerequisite:* For students enrolled in the one-year graduate course.

*Day Division:* Annually (lectures, discussions and projects averaging three hours a week).

*W. H. Kesterton*

### **Journalism 28.430 Editorial Practice and Policy**

Editing and the tasks and roles of the editor. Some practical work in copyreading and headline writing. The use of typography and illustrations. The responsibilities and opportunities of the editor and publisher. Editorial writing. The law of the press. The ethics of the press. Censorship. Copyright. Semantics. Style.

## Journalism

*Text:* Bastian, Case and Baskette, *Editing the Day's News*.

*Recommended Reading:* Schmeiser, *Civil Liberties In Canada*, Hayakaway, *Language In Thought and Action*.

*Prerequisite:* For students enrolled in the one-year graduate course.

*Day Division:* Annually (lectures and practical exercises, three hours a week).

*W. Eggleston and W. H. Kesterton*

### Journalism 28.440 Modern News Reporting

The theory and practice of covering the news of the day in all media. This course includes a series of practical reporting exercises of a realistic and increasingly complex nature. Reporting "in depth". Coverage of public affairs, and other specialized areas of human activity. Students in this course will be given opportunity to work in Ottawa newsrooms if they lack practical background.

*Prerequisite:* For graduate division students only.

*Day Division:* Annually (workshop and practical exercises averaging eight hours a week).

*T. J. Scanlon*

### Journalism 28.460 Public Issues and Problems

A series of seminars and round table discussions will be held on a number of the leading news topics of the day. Stress will be placed on those perennial problems certain to crop up in the years ahead. Each student will be responsible for lengthy investigations and reporting of one or more of these current issues.

*Prerequisite:* For students enrolled in the one-year graduate course.

*Day Division:* Annually (seminars of two hours a week and practical projects of varying length).

*Joel Weiner*

### Journalism 28.490 Honours Tutorial

Primarily a reading and research course in which students attempt to deepen their knowledge about the various fields of journalism. It will include work with a computer and will examine the impact of other technological developments on journalism. Students in this course will be given an opportunity to prepare and direct assignments given to other students.

*Prerequisite:* For Honours students only.

*Day Division:* Annually (three hours a week).

*T. J. Scanlon and Brian Taylor*

### Journalism 28.498 Honours Research

This is a thesis course. Students in this course will have to carry out directed research and prepare a thesis under the supervision of one faculty member.

*Prerequisite:* For Honours students only.

*Day Division:* Annually.

*Members of the Department*

### Journalism 28.499

Research course for graduate students similar to Journalism 28.498.

*Day Division:* Annually.

*Members of the Department*

# Law

Associate Professor;  
Chairman of the  
Department

R. D. Abbott

Assistant Professors

G. C. Eglinton, D. Fraser (on leave of absence,  
1969-70), J. G. Neuspiel

Sessional Lecturer

T. R. Swabey

The Department of Law does not offer an integrated series of courses leading to a Major or Honours in Law. Many of its courses have been established after consultation with the Department of Political Science, the School of Public Administration and the Committee on Commerce Studies and are intended to complement studies in those fields. Students intending to proceed to a law school should note that no credit is given for these courses toward a law degree. However, prospective law students should find the Legal Process course, Law 51.300, a valuable introduction. Members of the Department are available to advise prospective law students concerning their choice of courses at Carleton University.

## **Law 51.220 Commercial Law**

The law of contract and agency, sale of goods, negotiable instruments, partnerships and companies, bankruptcy and insolvency, bills of sale and chattel mortgages, conditional sales, bulk sales, bailment, banking, patents, trade marks and copyright, labour relations and other industrial legislation.

*Prerequisite:* An introductory course in Economics or permission of the instructor.

*Day and Evening Divisions:* Annually (lectures and discussion three hours a week).

## **Law 51.300 The Legal Process**

A study of the Canadian legal system including its concepts, institutions, processes and functions. (See Political Science p. 274).

*Prerequisite:* An introductory course in Political Science or permission of the instructor.

*Day Division:* Annually (lectures and discussion three hours a week).

R. D. Abbott

*Evening Division:* Annually (lectures and discussion three hours a week).

T. R. Swabey

## **Law 51.305 Introduction to Public Law**

Canadian legal institutions and processes concerned with the relationships between public authorities and between public authorities and individuals; delegated power and its control; survey of local government law, constitutional law and international law; law of employment in the public service.

*Prerequisite:* An introductory course in Political Science or permission of the instructor.

*Evening Division:* Annually (lectures and discussion three hours a week).

## **Law 51.321 Company Law**

The law relating to corporations and partnerships in Canada; the historical development of the corporate device; rights and duties of officers, directors, and shareholders of the corporation; legal aspects of corporate finance; comparative aspects of corporation law in the U.S., U.K., and Europe.

*Prerequisite:* Law 51.220 or permission of the instructor.

*Evening Division:* Annually (lectures and discussion three hours a week).



**Law 51.441 Labour Law**

Law of employment and of collective agreements; law relating to economic action of employers and employees, especially lockouts, strikes and picketing; union internal relations; related social and welfare aspects, fair employment practices and workmen's compensation.

*Prerequisite:* An introductory course in Economics or permission of the instructor.

*Evening Division:* Annually (lectures and discussion three hours a week).

**Law 51.450 Canadian Constitutional Law**

A study of the nature and limits of executive, legislative, and judicial power in Canada, as interpreted by the courts. The distribution of powers under the Canadian Constitution. (See Political Science p. 275).

*Prerequisites:* Law 51.300 or 51.305, or permission of the instructor.

*Evening Division:* Annually (lectures and discussion three hours a week).

*J. G. Neuspiel*

**Law 51.461\* International Commercial Law**

A study of the legal problems of Canadian business abroad and foreign business in Canada. (In 1969-70 the emphasis will be on trade relations with the European Common Market.)

*Prerequisite:* Permission of the Department.

*Day or Evening Division:* 1969-70 (lectures and discussion three hours a week, second term).

**Law 51.463 Public International Law**

The law concerning relationships among states. Nature and sources of international law. International personality of states; the position of the individuals; creation and effect of international obligations; importance and functions of international tribunals in the settlement of disputes. (See Political Science p. 275).

*Prerequisite:* Law 51.300 or 51.305, or permission of the instructor.

*Evening Division:* Annually (seminar three hours a week).

*J. G. Neuspiel*

**Law 51.474 Local Government Law**

The law concerning the structure, financing and functions of municipal and other local government bodies in Canada. Judicial control of such bodies and their officials. Introduction to land use control.

*Prerequisite:* Law 51.300 or 51.305 or permission of the instructor.

*Not offered, 1969-70.*

**Law 51.498 Tutorial in Law**

Tutorial hours arranged.

*Prerequisite:* Permission of the Department.

**Law 51.555 Administrative Law**

A study of administrative law in the light of current social and economic problems and relationships and in the light of the trends of modern legislation, with particular reference to Canada. Theories influencing developments in the field; delegated legislative and delegated adjudicative powers, their nature and extent, reasons for delegation, dangers; judicial and extra-judicial review and control; administrative procedure; suggested reforms. (See Political Science p. 279).

*Prerequisite:* Law 51.300 or 51.305, or permission of the instructor.

*Evening Division:* Annually (lectures and discussion three hours a week).

*R. D. Abbott*

# Mathematics

Professor; Chairman  
of the Department  
Professors

R. L. Rosenberg  
P. R. Beesack, D. K. Dale, V. Dlab, M. S. Macphail,  
P. Mandl, F. H. Northover, D. W. Sida  
Associate Professors  
J. D. Dixon, C. W. L. Garner, J. E. Graham,  
L. D. Nel, E. J. Norminton, B. M. Puttaswamaiah,  
M. Rahman, E. Saleh, Helga H. Schirmer, R. J. Semple,  
K. S. Williams  
Assistant Professors  
K. Clancey, F. Giesbrecht, K. Hardy, A. B. M. L. Kabir,  
M. J. Moore, J. N. Pandey, J. C. Poland, A. Shafaat,  
P. Tan, G. Zelmer  
Lecturers  
D. Jacobson, J. Thompson, Marion J. Watson

**Course Numbering:** Course numbers prefixed by 70. indicate courses intended for honours students; all other courses have numbers prefixed by 69. *Credit will not be given for both of two courses having the same number but different prefixes.*

**First Year:** Students entering First year who plan to take a Major or Honours in Mathematics should obtain the advice of the Department as to their choice of courses.

## Major in Mathematics

### 1. Requirements for B.Sc.

(a) Successful completion of first year with a grade of C— or better in two courses, one of which must be in Mathematics 69.100<sup>(1)</sup>.

(b) The following Mathematics courses:

#### Second Year

69.205\*

69.215\*

69.245\*

69.257\*

#### Third Year

(i) the equivalent of two full courses from 69.307\*, 69.308\*,  
69.309\*, 69.310, 69.325\*, 69.326\*, 69.335\*, 69.341,  
69.350

(ii) the equivalent of one full course in the range 69.307\* to  
69.365\*

(c) Two courses from one Science<sup>(2)</sup> department other than Mathematics (three if one was not taken in the first year) and two courses from the Faculty of Arts.

(d) One optional course which may be in Mathematics.

### 2. Requirements for B.A.

(a) Successful completion of first year with a grade of C— or better in Mathematics 69.100.<sup>(1)</sup>

(b) The following Mathematics courses:

#### Second Year

69.205\*

69.215\*

69.245\*

69.257\*

#### Third Year

(i) the equivalent of two full courses from 69.307\*, 69.308\*,  
69.309\*, 69.310, 69.325\*, 69.326\*, 69.335\*, 69.341,  
69.350

(ii) the equivalent of one full course in the range 69.307\* to  
69.365\*

<sup>(1)</sup>With satisfactory standing in his course program and a grade of B— or better in Mathematics 69.101, a student may be permitted by the Department to major in Mathematics after the completion of additional readings in Mathematics.

<sup>(2)</sup>The following Psychology courses also will be accepted as continuation courses from a Science department: Psychology 49.200\*, 49.201\*, 49.220\*, 49.221\*, 49.222\*, 49.270\*, 49.271\*, 49.321\*, 49.322\*, 49.330\*, 49.332\*, 49.380\*.

Mathematics

(c) Two courses from one Arts department other than Mathematics (three if one was not taken in the first year) and one of Biology 61.100, Chemistry 65.010, 65.100 or 65.105, Geology 67.100 or Physics 75.010, 75.100 or 75.105.

(d) Two optional courses one or both of which may be in Mathematics.

3. *Requirements for a combined Major in Arts:*

In general, the requirements will be the same as those in section 2 above except that the equivalent of only one full course in 2(b)(i) will be required instead of two. All such programs must be arranged in consultation with the Mathematics Department.

4. Of the total fifteen courses at least eight must be numbered 200 or higher.

5. All course selections must be approved by the Mathematics Department.

6. In certain cases, with the permission of the department, the courses listed in 1(b) and 2(b) above may be replaced by corresponding honours courses, that is, courses having the number prefix 70.

Honours in Mathematics

1. *Requirements for Honours B.A. or B.Sc.*

(a) Successful completion of first year with a grade of at least C— in Mathematics 69.100<sup>(1)</sup> and a g.p.a. overall of at least 3.6 in the first year.

(b) At least the following mathematics courses:

*Second Year*

70.200

70.210

70.245\*

70.257\*

*Third and Fourth Years*

70.300

70.307\*

70.310

70.495\*

- (i) the equivalent of one and a half courses at the 400 level
- (ii) the equivalent of one and a half courses selected from 70.308\*, 69.325\*, 69.326\*, 70.341, 70.350, 69.351, and all courses at the 400 level

It is strongly recommended that 70.300 be taken in the third year.

(c) Six additional courses at least four of which are numbered 200 or higher, and which may be in mathematics provided that: for the B.Sc., of these six courses, at least two must be in one Science<sup>(2)</sup> department other than Mathematics (three if one was not taken in the first year) and at least two must be from the Faculty of Arts; for the B.A., of these six courses, at least two must be in one Arts department other than Mathematics (three if one was not taken in the first year).

2. All course selections must be approved by the Mathematics Department.

3. The B.Sc. candidate must pass a reading knowledge examination in one of French, German or Russian.

4. Mathematics 70.495\* is the Honours Project in Mathematics. It consists of a written report on some approved topic or topics in the field of mathematics together with a short lecture on the report. Each student should commence work on his project under a faculty supervisor before June 1 of his third academic year.

<sup>(1)</sup>With satisfactory standing in his course program and a grade of B— or better in Mathematics 69.101, a student may be permitted by the Department to major in Mathematics after the completion of additional readings in Mathematics.

<sup>(2)</sup>The following Psychology courses also will be accepted as continuation courses from a Science department: Psychology 49.200\*, 49.201\*, 49.220\*, 49.221\*, 49.222\*, 49.270\*, 49.271\*, 49.321\*, 49.322\*, 49.330\*, 49.332\*.

The first draft of this report must be submitted to a supervisor by November 1, and the final draft to the department by January 15. Students who do not meet this latter deadline are deemed to have failed the course.

### Combined Honours in Mathematics and Physics

#### 1. *Requirements for Combined Honours B.Sc.*

(a) Successful completion of first year with a grade of at least C— in each of Mathematics 69.100<sup>(1)</sup> and Physics 75.100<sup>(1)</sup>, and a g.p.a. overall of at least 3.6 in the first year.

(b) The following eighteen courses:

#### *Second Year*

Mathematics 70.200  
Mathematics 70.210  
Mathematics 70.245\*  
Mathematics 70.257\*  
Physics 75.211\*  
Physics 75.231\*  
Physics 75.222\*  
Physics 75.242\*  
One course from the  
Faculty of Arts

#### *Third Year*

Mathematics 70.300  
Mathematics 70.307\*  
Mathematics 70.308\*  
Mathematics 70.310  
Mathematics 70.341  
Physics 75.307\*  
Physics 75.381\* or  
Engineering 93.357\* or 95.366\*  
Physics 75.388\*  
Physics 75.360

#### *Fourth Year*

One Mathematics course at the 400 level

Physics 75.407\*  
Physics 75.437\*  
Physics 75.447\*  
Physics 75.476

Physics 75.499 or Mathematics 70.495\* and another half course in Mathematics at the 400 level

One course in Mathematics or Physics

2. The requirements specified in sections 2, 3, 4, under Honours in Mathematics must be satisfied.

3. During the Fourth year, comprehensive examinations are given.

<sup>(1)</sup>With satisfactory standing in his course program and a grade of B— or better in Mathematics 69.101 and/or Physics 75.105, a student may be permitted by both departments to take combined Honours in Mathematics and Physics after the completion of additional readings.

### Combined Honours in Economics and Mathematics

#### 1. *Requirements for Combined Honours B.A.*

(a) At least seven courses in Economics to include Economics 43.100, 43.200, 43.210, 43.315 or 43.325 or another economics course with permission of the Department, 43.490\* or, with permission of the Department, 43.575, 43.498 and one other 400 level course.

(b) At least eight courses in Mathematics to include Mathematics 69.100<sup>(1)</sup>, 70.200, 70.210, 70.245\*, 70.257\*, 70.300, 70.350 and two other courses at the 300 level or above, at least one of which is at the 400 level.

<sup>(1)</sup>With satisfactory standing in his course program and a grade of B— or better in Mathematics 69.101, a student may be permitted by the department to major in Mathematics after the completion of additional readings in Mathematics.

## Mathematics

2. The requirements for comprehensive examinations in both departments must be satisfied.
3. Each year's program must be determined in consultation with the two departments.

### Combined Honours in Philosophy and Mathematics

#### 1. *Requirements for Combined Honours B.A.*

(a) At least seven courses in Philosophy to include an introductory course, Philosophy 32.205, 32.220, 32.215, 32.230, 32.490 or 32.491 and another Philosophy course.

(b) At least eight courses in Mathematics to include Mathematics 69.100, 70.200, 70.210, 70.245\*, 70.257\*, 70.300, 70.310, and two other courses in Mathematics at the 300 level or above, at least one of which is at the 400 level. If Philosophy 32.491 is selected then Mathematics 70.495\* must be taken.

2. The requirements for comprehensive examinations in both departments must be satisfied.
3. Each year's program must be determined in consultation with the two departments.

### Requirements for Graduate Degrees

#### *Master of Science*

1. For admission to the degree program, candidates must have the equivalent of an Honours degree in Mathematics with at least second class honours standing. Candidates with a Pass degree may, with the permission of the department, be admitted to a qualifying year to attain the above requirement. Candidates are required to write the Advanced Tests in Mathematics of the Graduate Record Examinations.

2. The course requirements are:

- a) three or four courses and a suitable thesis or
- b) five courses, without a thesis.

All courses must be selected from the 400 and 500 series and not more than two of them must be in the 400 series.

3. The candidate will be required to give satisfactory evidence of his ability to read mathematical literature in one of French, German, or Russian.

4. If a thesis is written the candidate will be required to take an oral examination on the subject of his thesis.

#### *Doctor of Philosophy*

1. For admission to the degree program, candidates must have the equivalent of a Master's degree in mathematics.

2. The course requirements are a minimum of three courses in the 500 series and a suitable thesis.

3. The candidate will be required to give satisfactory evidence of his ability to read mathematical literature in two languages (other than English) as specified by the Department.

4. Each candidate will be required to take a comprehensive examination covering appropriate fields in mathematics and a final oral examination on the subject of his thesis and related fields.

All graduate programs must meet the approval of the department.

### Mathematics 69.010 Introductory Analysis

Logical reasoning, function as a mapping, second degree relations in the plane, trigonometry, transformations in the plane, slopes and simple derivatives; applications of differentiations.



*Day Division:* Annually (lectures three hours a week).

*Evening Division:* Annually (lectures three hours a week).

### **Mathematics 69.011** Introductory Algebra

Sets, subsets, and permutations; mathematical induction and the binomial theorem; probability; vectors; equations of lines and planes; systems of linear equations; matrices and linear transformations; complex numbers and polar coordinates.

*Prerequisite:* Taken concurrently with Mathematics 69.010.

*Day Division:* Annually (lectures three hours a week).

*Evening Division:* Annually (lectures three hours a week).

### **Mathematics 69.100** Introductory Calculus and Algebra

Functions, limits and derivatives, differentiation of algebraic functions, applications, the definite integral, special functions, formal integration, approximations, Taylor's theorem with remainder. Sets, number systems, matrix algebra, vector geometry, vector functions.

*Prerequisites:* Mathematics 69.010 and 69.011 (Grade 13 Mathematics A and B).

*Day Division:* Annually (lectures four hours a week, one hour tutorial).

*Evening Division:* Annually (lectures four hours a week, one hour tutorial).

### **Mathematics 69.101** Introductory Mathematics

Calculus: limits; derivatives; chain rule; implicit differentiation; maxima, minima, graphing; differentiation of logarithmic, exponential, trigonometric and inverse trigonometric functions; partial differentiation; maxima, minima of functions of two variables; integration; definite integrals; antiderivatives; fundamental theorem of the calculus; methods of integration; multiple integration; introduction to differential equations. Linear Algebra: vectors; matrices; determinants; inverse matrix; Cramer's rule; elementary row operations; systems of linear equations; mathematical systems.

*Prerequisites:* Mathematics 69.010 or Mathematics A (or its equivalent).

*Day Division:* Annually (lectures three hours a week, one hour tutorial).

*Evening Division:* Annually (lectures three hours a week, one hour tutorial).

### **Mathematics 69.130** General Mathematics

Deductive nature of mathematics; the axiomatic method; selected topics, such as probability; introduction to calculus, matrix algebra, topology.

*Day Division:* Annually (lectures three hours a week).

### **Mathematics 69.135\*** Algebra and Geometry

Sets, Boolean algebra, vector geometry, spherical trigonometry.

*Prerequisite:* Engineering students, first year.

*Day Division:* Annually (lectures one hour a week, both terms).

### **Mathematics 70.200** Intermediate Calculus

Real numbers, sequences, infinite series of real or complex constants, limits and continuity, functions of several variables, definite, multiple, line integrals, infinite series of functions.

*Prerequisite:* Mathematics 69.100. (Honours Students).

*Day Division:* Annually (lectures three hours a week).

## Mathematics

### **Mathematics 69.201** Intermediate Calculus and Algebra

Differential calculus of functions of several variables, multiple integration, elements of infinite series, linear algebra, differential equations.

*Prerequisite:* Mathematics 69.100 or 69.101.

*Day Division:* Annually (lectures four hours a week).

### **Mathematics 69.202** Intermediate Mathematics

Partial differentiation; infinite series; multiple integration; differential equations; Fourier series; introduction to matrix and other eigenvalue problems.

*Prerequisite:* Mathematics 69.100 or 69.101 (Science students).

*Day Division:* Annually (lectures three hours a week).

### **Mathematics 69.205\*** Intermediate Calculus

Review of three dimensional analytic geometry, partial differentiation, infinite series, indeterminate forms, l'Hospital's rule, multiple integration, implicit functions, transformations, Jacobians. (Half course).

*Prerequisite:* Mathematics 69.100.

*Day Division:* Annually (lectures three hours a week, one hour tutorial, first term).

*Evening Division:* Annually (lectures three hours a week, one hour tutorial, first term).

### **Mathematics 70.210** Linear Algebra

Set theory, algebraic systems, vector spaces, inner product spaces, linear transformations, determinants, quadratic forms, selected applications.

*Prerequisite:* Mathematics 69.100 (Honours students).

*Day Division:* Annually (lectures three hours a week).

### **Mathematics 69.215\*** Linear Algebra

An introduction to vector spaces; theory of linear transformations and matrices; applications. (Half course).

*Prerequisite:* Mathematics 69.100 or 69.101.

*Day Division:* Annually (lectures three hours a week, one hour tutorial, first term).

*Evening Division:* Annually (lectures three hours a week, one hour tutorial, second term).

### **Mathematics 69.245\*** Introduction to Applied Mathematics

Ordinary differential equations of first and second order, introduction to classical mechanics in one and two dimensions. (Half course).

*Prerequisite:* Mathematics 69.100.

*Day Division:* Annually (lectures three hours a week, one hour tutorial, second term).

*Evening Division:* Annually (lectures three hours a week, one hour tutorial, second term).

### **Mathematics 70.245\*** Introduction to Applied Mathematics

An introduction to the dynamics of a particle and of a rigid body in one and two dimensions. (Half course).

*Prerequisite:* Mathematics 69.100 (Honours students).

*Day Division:* Annually (lectures three hours a week, one hour tutorial, second term).

**Mathematics 69.250** Introduction to Statistical Analysis

Frequency distributions; moments; measures of central tendency, dispersion, skewness; probability; distributions, Binomial, Poisson, Normal,  $z$ ,  $t$ ,  $F$ ,  $\chi^2$ ; statistical inference, confidence intervals; experimental designs, randomized block, Latin square; enumeration statistics; least squares analysis, introduction to correlation and regression analysis; non-parametric tests.

*Prerequisites:* Mathematics 69.010 and 69.011 (non-mathematics students).

*Day Division:* Annually (lectures three hours a week, two hours laboratory).

*Evening Division:* Annually (lectures three hours a week, two hours laboratory).

**Mathematics 69.257\*** Introduction to Statistics

Introduction to probability, sample space; descriptive statistics, histograms, ogives, moments; density functions, analogy with discrete distributions, univariate and bivariate, binomial, Poisson, uniform, normal; confidence intervals; use of  $t$ ,  $\chi^2$ ,  $F$  distributions, tests of hypotheses, analysis of variance: introduction to regression analysis. (Half course).

*Prerequisite:* Mathematics 69.100 or 69.101.

*Day Division:* Annually (lectures three hours a week, three hours laboratory, second term).

*Evening Division:* Annually (lectures three hours a week, three hours laboratory, first term).

**Mathematics 70.257\*** Introduction to Statistics

Introduction to probability, sample space; descriptive statistics, histograms, ogives, moments; density functions, analogy with discrete distributions, univariate and bivariate, binomial, Poisson, uniform, normal; confidence intervals; use of  $t$ ,  $\chi^2$ ,  $F$  distributions, tests of hypotheses, analysis of variance: introduction to regression analysis. (Half course).

*Prerequisite:* Mathematics 69.100 (Honours students).

*Day Division:* Annually (lectures three hours a week, three hours laboratory, first term).

**Mathematics 70.300** Introduction to Analysis

Power series; countable and uncountable sets; improper integrals; monotonic and convex functions, functions of bounded variation; metric spaces and Euclidean spaces; differentiation and implicit function theorems; multiple integrals.

*Prerequisites:* Mathematics 70.200 and 70.210 or Mathematics 69.205\*, 69.309\* and 69.215\*, or permission of the Department.

*Day Division:* Annually (lectures three hours a week).

**Mathematics 69.305\*** Functions of a Complex Variable

Analytic functions: contour integration: residues: conformal transformations: Laplace transform. (Half course).

*Prerequisites:* Mathematics 69.205\* and 69.245\* or 69.201 (engineering students).

*Day Division:* Annually (lectures three hours a week, first term).

**Mathematics 69.306\*** Mathematical Methods I

Series solution of ordinary differential equations: solution of partial differential equations of mathematical physics: special functions: Fourier analysis: boundary value problems. (Half course).

*Prerequisites:* Mathematics 69.205\* and 69.245\* or 69.201 (engineering students).

*Day Division:* Annually (lectures three hours a week, second term).

## Mathematics

### **Mathematics 69.307\*** Functions of a Complex Variable

Analytic functions, contour integration, residue calculus, conformal mapping. (Half course).

*Prerequisites:* Mathematics 69.205\* and 69.245\* or Mathematics 69.201 or 69.202 (non-engineering students).

*Day Division:* Annually (lectures three hours a week, first term).

### **Mathematics 70.307\*** Functions of a Complex Variable

Analytic functions, contour integration, residue calculus, conformal mapping. (Half course).

*Prerequisite:* Mathematics 70.200 or permission of the Department.

*Day Division:* Annually (lectures three hours a week, first term).

### **Mathematics 69.308\*** Boundary Value Problems

Differential equations; solution in series; the formulation of boundary value problems in mechanics, heat conduction, etc.; the method of separation of variables; eigenfunctions and eigenvalues; Fourier series; Legendre polynomials and applications; the method of Laplace transforms. (Half course).

*Prerequisites:* Mathematics 69.205\* and 69.245\* or Mathematics 69.201 or 69.202 (non-engineering students).

*Day Division:* Annually (lectures three hours a week, second term).

### **Mathematics 70.308\*** Theory of Ordinary Differential Equations

Picard's existence-uniqueness theorem, linear differential equations of  $n$ th order, Laplace transform techniques, solution in series, Frobenius' method, oscillation theorems. (Half course).

*Prerequisites:* Mathematics 70.200; 70.300, 70.307\* (may be taken concurrently) or permission of the Department.

*Day Division:* Annually (lectures three hours a week, second term).

### **Mathematics 69.309\*** Topics in Analysis

The real number system, sequences and series, functions of a single real variable, derivatives, the definite integral, uniform convergence, functions of several variables. (Half course).

*Prerequisite:* Mathematics 69.205\* or 69.201.

*Day and Evening Divisions:* Annually (lectures three hours a week, second term).

### **Mathematics 69.310** Modern Algebra

Introduction to modern algebraic structures — semigroups, groups, rings, integral domains, fields, number systems, vector spaces and lattices.

*Prerequisite:* Mathematics 69.215\*.

*Day Division:* Annually (lectures three hours a week).

### **Mathematics 70.310** Modern Algebra

Introduction to modern algebraic structures — semigroups, groups, rings, integral domains, fields, number systems, vector spaces and lattices.

*Prerequisite:* Mathematics 70.210, or permission of the Department.

*Day Division:* Annually (lectures three hours a week).

**Mathematics 69.325\*** Advanced Euclidean Geometry

Transformations of the plane: isometries, similarities, inversion. Groups of symmetries of plane figures and regular polyhedra. Orthogonal circles, pencils of coaxial circles. (Half course).

*Prerequisite:* Mathematics 69.215\*.

*Day Division:* Annually (lectures three hours a week, first term).

**Mathematics 69.326\*** Plane Projective Geometry

Axioms of projective geometry, principle of duality; one-dimensional projectivities and the Fundamental theorem; collineations (homologies and elations), correlations (polarities and the conic); introduction to finite projective planes. (Half course).

*Prerequisite:* Mathematics 69.215\*.

*Day Division:* Annually (lectures three hours a week, second term).

**Mathematics 69.335\*** Introduction to the Theory of Numbers

Euclidean algorithm, unique factorization theorem, linear diophantine equations, congruences, Fermat and Wilson theorems, primitive roots, quadratic residues, arithmetic functions, sums of squares, Pell's equation, rational approximation to real numbers. (Half course).

*Prerequisites:* Mathematics 69.205\*, 69.215\*.

*Day Division:* Annually (lectures three hours a week, first term).

**Mathematics 69.341** Applied Mathematics

The dynamics of a system of particles with applications to astronomy and other physical sciences. Conservation laws; planetary motion; inertial forces and accelerating coordinate systems; elementary potential theory; hydrodynamics; applications to astronomy.

*Prerequisites:* Mathematics 69.205\*, 69.215\*, 69.245\*.

*Day Division:* Annually (lectures three hours a week).

**Mathematics 70.341** Applied Mathematics

A study of the methods and techniques of applying mathematical concepts and models; with special reference to dynamics of a particle and rigid body, statics, mechanics of continuous media.

*Prerequisite:* Mathematics 70.200, 70.245\*, or permission of the Department.

*Day Division:* Annually (lectures three hours a week).

**Mathematics 69.350** Statistical Theory

Probability distributions for discrete and continuous random variables (univariate and bivariate); mathematical expectation and generating functions; sampling distributions; point and interval estimation; tests of hypotheses (theory and applications); introduction to non-parametric methods.

*Prerequisite:* Mathematics 69.205\*, 69.215\*, 69.257\*.

*Day Division:* Annually (lectures three hours a week).

**Mathematics 70.350** Mathematical Statistics I

Probability distributions, discrete and continuous, univariate and multivariate, expected value; moment generating functions; limit theorems, law of large numbers, orthogonal linear functions, derived sampling distributions; fundamentals in estimation procedures; maximum likelihood; tests of hypotheses; power functions; applications.



## Mathematics

*Prerequisites:* Mathematics 70.200, 70.210 and 70.300 (taken concurrently) or permission of the Department.

*Day Division:* Annually (lectures three hours a week).

### **Mathematics 69.351** Statistical Methods

Linear programming and the simplex method; simple and multiple regression techniques; experimental design including the completely randomized, randomized block, Latin square and complete factorial experiments; the analysis of covariance; distribution-free methods; statistical quality control.

*Prerequisite:* Mathematics 69.257\* or 70.257\*, or Mathematics 69.100 or 69.101 and 69.250.

*Day Division:* Annually (lectures three hours a week, laboratory two hours a week).

### **Mathematics 69.365\*** Numerical Analysis

Elementary discussion of error, polynomial interpolation, quadrature, linear systems of equations and matrix inversion, non-linear equations, difference equations and ordinary differential equations. (Half-course).

*Prerequisites:* Computing Science 95.200\*, Mathematics 69.205\*, 69.215\* and 69.245\* or Mathematics 69.201 or 69.202.

*Day and Evening Divisions:* Annually (lectures three hours a week and laboratory, second term).

A selection from the following courses in the 400 series will be offered.

### **Mathematics 70.400** Introduction to Partial Differential Equations

First order equations and systems; second order linear equations; elements of distributions; potential theory in two dimensions; equations of motion; eigenfunctions; Green's functions; classical cylindrical and spherical problems.

*Prerequisites:* Mathematics 70.300, 70.308\*, or permission of the Department.

### **Mathematics 70.403\*** Banach Spaces

Metric spaces, Baire's Category theorem, contraction mappings and applications; Banach spaces, subspaces and product spaces; continuous linear functionals, the dual space; Banach spaces of continuous functions, Stone-Weierstrass theorem, equicontinuity and Ascoli's theorem; Banach spaces of bounded linear operators, uniform boundedness, open mapping, bounded inverse and closed graph theorems. (Half-course).

*Prerequisite:* Mathematics 70.300 or permission of the Department.

### **Mathematics 70.404\*** Introduction to Hilbert Space

Scalar product, projections, completeness, linear functionals, Riesz' theorem, bounded operators, adjoint and self-adjoint operators, completely continuous operators, unitary, isometric operators, eigenvectors, spectral analysis of completely continuous operators. (Half course).

*Prerequisites:* Mathematics 70.310, 70.407\*, 70.423 (may be taken concurrently) or permission of the Department.

### **Mathematics 70.405\*** Functions of a Complex Variable

General properties of analytic functions. (Half course).

*Prerequisites:* Mathematics 70.300 and 70.307\* or permission of the Department.

**Mathematics 70.406\*** Special Functions

Gamma, Hypergeometric, Bessel and Legendre functions. (Half course).

*Prerequisite:* Mathematics 70.405\* (taken concurrently) or permission of the Department.

**Mathematics 70.407\*** Measure Theory

Measure theory and integration of real-valued functions. (Half course).

*Prerequisite:* Mathematics 70.300 or permission of the Department.

**Mathematics 70.408\*** Asymptotic Series

Theory of asymptotic series; methods of derivation (method of steepest descents). (Half course).

*Prerequisite:* Mathematics 70.406\* or permission of the Department.

**Mathematics 69.409\*** Mathematical Methods II

Uniform convergence, general theory of linear differential equations, Frobenius' method, partial differential equations. (Half course).

*Prerequisites:* Mathematics 69.305\* and 69.306\* (Engineering students).

**Mathematics 70.415\*** Rings and Modules

Fundamental concepts in rings and modules; structure theorems; applications. (Half-course).

*Prerequisite:* Mathematics 70.310 or permission of the Department.

**Mathematics 70.416\*** Group Theory

Fundamental principles as applied to abelian, nilpotent, solvable, free, and finite groups; representations. (Half course).

*Prerequisite:* Mathematics 70.310 or permission of the Department.

**Mathematics 70.417\*** Commutative Algebra

Fields, including algebraic and transcendental extensions, Galois theory, valuation theory; Noetherian commutative rings, including Noether decomposition theorem and localization. (Half course.)

*Prerequisite:* Mathematics 70.310 or permission of the Department.

**Mathematics 70.418\*** Homological Algebra and Category Theory

Axioms of set theory; categories; functors; natural transformations; free, projective, injective, and flat modules; tensor products and homology functors, derived functors, dimension theory. (Half course.)

*Prerequisite:* Mathematics 70.310 or permission of the Department.

**Mathematics 70.420** Modern Geometry

Incidence, absolute, hyperbolic, elliptic, metric-projective geometries. Embedding of hyperbolic and Euclidean geometries in projective plane, groups of motions, models of non-Euclidean geometry.

*Prerequisite:* Mathematics 70.310 or permission of the Department.

**Mathematics 70.423** Introduction to Topology

Basic properties of general topological spaces, maps, product- and quotient-spaces, separation axioms, connectedness, compactness, More-Smith convergence, introduction to homotopy theory.

*Prerequisites:* Mathematics 70.300, 70.310 (may be taken concurrently), or permission of the Department.

## Mathematics

### **Mathematics 70.430** Theory of Numbers

Algebraic number theory, algebraic number fields, bases, algebraic integers, integral bases, arithmetic in algebraic number fields, ideal theory. Geometric number theory, lattices, Blichfeldt's and Minkowski's theorems, distance functions, convex bodies. Analytic number theory, Dirichlet series, characters, Zeta-functions, prime number theorem, Dirichlet's theorem on primes in arithmetic progressions.

*Prerequisites:* Mathematics 70.307\*, 70.310 or permission of the Department.

### **Mathematics 70.431** Introduction to Mathematical Logic

Symbolic logic, set theory, abstract algebra, propositional calculus, the predicate calculus, completeness.

*Prerequisite:* Permission of the Department.

### **Mathematics 70.445\*** Analytical Dynamics

Lagrange's equations; small oscillations; rigid dynamics in three dimensions; motion of top; introduction to Hamiltonian mechanics. (Half course).

*Prerequisite:* Mathematics 70.341 or permission of the Department.

### **Mathematics 70.446\*** Hydrodynamics

Two dimensional inviscid flow; vortex motion; application of conformal transformation; axi-symmetric flows. (Half course).

*Prerequisites:* Mathematics 70.307\* and 70.341 or permission of the Department.

### **Mathematics 70.447\*** Tensor Analysis and Relativity Theory

Development of tensor analysis, application to Riemannian spaces and relativity theory. (Half course).

*Prerequisite:* Mathematics 70.341 or permission of the Department.

### **Mathematics 70.448\*** Introduction to Electromagnetic Theory

Electrostatics, Poisson and Laplace's equations, steady electric currents, dielectrics, the electro-magnetic field, magnetostatics, Maxwell's equations for bodies at rest. (Half course).

*Prerequisites:* Mathematics 70.341, 70.307\* or permission of the Department.

### **Mathematics 70.450** Mathematical Statistics II

Distribution functions; mean values and moment of random variables; sequences of random variables; characteristic functions; special discrete and continuous distributions; sampling distributions; asymptotic sampling theory for large samples; parametric and non-parametric statistical estimation and hypothesis testing; statistical decision functions.

*Prerequisites:* Mathematics 70.350, 70.300 (may be taken concurrently), or permission of the Department.

### **Mathematics 70.451** Probability Theory

Introduction to probability, characteristic functions, probability distributions, limit theorems, stochastic processes.

*Prerequisite:* Mathematics 70.350 or permission of the Department.

### **Mathematics 70.452** Sampling: Theory and Methods

Basic concepts; simple random sampling; stratified sampling, allocation methods; multi-stage sampling; probability sampling; double sampling, sequential tests; ratio and regression estimates; selection methods.

*Prerequisite:* Mathematics 70.350 or permission of the Department.

**Mathematics 70.453** Correlation and Regression Analysis

Linear estimators; the method of least squares; simple linear regression techniques and theory; the Markoff theorem; non-linear regression; multiple linear regression, multiple and partial correlation; covariance analysis; orthogonal polynomials, harmonic analysis, internal least squares, the modified Gauss-Newton method, discriminant analysis; introduction to the theory of the general linear hypothesis.

*Prerequisite:* Mathematics 70.350 or permission of the Department.

**Mathematics 70.490** Directed Special Studies

Advanced problems and readings from various mathematical fields. A report or thesis on a specific aspect of mathematics may be required. An examination is set, covering the whole course.

*Prerequisite:* Honours Mathematics students only.

**Mathematics 70.495\*** Honours Project

This consists of a written report on some approved topic or topics in the field of mathematics, together with a short lecture on the report. (Half course).

*Prerequisite:* Honours Mathematics students only.

**Graduate Studies**

The Department of Mathematics provides graduate studies leading to the degrees of M.Sc. and Ph.D. in Mathematics.

Fields in which graduate research will be supervised include:—

*Pure Mathematics*

Algebra: groups; group representation; rings and modules; universal algebra; field theory.

Analysis: inequalities; summability; special functions; asymptotic expansions; functional analysis; function spaces and algebras; rings of continuous functions; generalized integral transforms.

Geometry: non-Euclidean, projective and finite geometries; regular figures.

Number theory: asymptotic theory; finite fields; analytic number theory.

Topology: general topology; theory of fixed points and coincidences; set-valued mappings.

*Applied Mathematics*

Compressible fluids; shock waves; airfoil theory; diffusion and convection; magnetohydrodynamics; electromagnetic and diffraction theory; kinetic theory of gases; upper atmosphere problems; dynamics of stellar systems.

*Statistics*

Sampling theory; multivariate analysis; estimation theory and testing of hypotheses; order statistics and non-parametric methods; distributions; regression analysis.

A selection from the following courses will be offered:

**Mathematics 70.501\*** Topological Vector Spaces

Linear spaces; balanced, absorbing and convex sets; seminorms; topology, nets and filters; FK spaces; duality and the Mackey-Arens theorem.

(Half course, second term).

**Mathematics 70.503\*** Banach Algebras

Commutative Banach algebras; the space of maximal ideals; representation of Banach algebras as function algebras and as operator algebras; the spectrum of an

## Mathematics

element; special types of Banach algebras e.g. regular algebras, algebras with involution; applications.

(Half course, first term).

### Mathematics 70.504 Integral Equations

A survey of the main results in the theory of non-singular linear integral equations; Volterra and Fredholm equations of first and second kind in the  $L_2$  case, with special results for the continuous case; Hermitian kernels; eigenfunction expansions; compact operators.

### Mathematics 70.505\* Harmonic Analysis on Groups

Transformation groups; Haar measure; unitary representations of locally compact groups; completeness and compact groups; character theory; decomposition.

(Half course, second term).

### Mathematics 70.506\* Applications of Generalized Functions

Generalized integral transforms: Laplace, Mellin, Hankel, Weierstrass, K and Convolution transforms; solutions of partial differential equations by generalized integral transform technique; further applications.

(Half course, second term).

### Mathematics 70.507\* Rings of Continuous Functions

A study of the ring  $C(X)$  of all real-valued continuous functions on a topological space  $X$ ; characterization of the maximal ideals in  $C(X)$  using the Stone-Cech compactification.

(Half course, first term).

### Mathematics 70.508\* Partially Ordered Structures in Functional Analysis

Vector lattices, positive linear functionals,  $L$ -spaces and  $M$ -spaces. Selected topics from partially ordered linear topological spaces and partially ordered rings.

(Half course, second term).

### Mathematical 70.510 General Algebra

Selected topics from: universal algebras, varieties, order, lattice theory, models, nonassociative rings, and applications.

### Mathematics 70.511 Theory of Groups

Selected topics from: infinite abelian groups, solvable and nilpotent groups, free groups and free products, structure of finite groups, linear groups.

### Mathematics 70.512 Group Representations and Applications

An introduction to group representations and character theory with selected applications.

### Mathematics 70.513 Rings and Modules

Generalizations of the Wedderburn-Artin theorem and applications, homological algebra.

### Mathematics 70.514 Commutative Algebra

Selected topics from: field theory, noetherian rings, local rings, valuations, and elements of algebraic geometry.



**Mathematics 70.515** Topological Groups

General topological groups, subgroups and factor groups, local properties, Haar integral, Lie groups.

**Mathematics 70.520** Non-Euclidean Geometry

Development of elliptic and hyperbolic geometry from real projective geometry; a study of a selection of classical and current topics in hyperbolic spaces.

**Mathematics 70.521** Foundation of Geometry

Various axiom systems of geometry. Detailed examinations of at least one modern approach to foundations, with emphasis upon the connections with group theory.

**Mathematics 70.522** Finite Geometries

A study of recent results in finite projective and affine planes; connections with balanced incomplete block designs and other combinatorial problems.

**Mathematics 70.523** Algebraic Topology

Homology theory: axiomatic foundations, singular homology, applications to topology and algebra. Connections between homology and homotopy theory.

**Mathematics 70.524** Advanced General Topology

Selected advanced topics, such as: uniform spaces, function spaces, the metrization problem, dimension theory.

**Mathematics 70.530** Methods of Number Theory

Introduction to the Hardy-Littlewood method, sieve methods of Brun and Selberg, character sums.

**Mathematics 70.532** Algebraic Number Theory

Valuations, local fields, algebraic number fields, class number, unit theorem, extensions of number fields, ramification theory, quadratic and cyclotomic fields.

**Mathematics 70.540** Advanced Classical Mechanics

Hamiltonian dynamics; integral invariants; non-holonomic systems; rigid body motions.

**Mathematics 70.541** Kinetic Theory of Gases and Plasmas

Irreversible processes in gasses; Boltzmann and Fokker-Planck equations; theories of Bogoliubov and of Frieman and Sandri; inhomogeneous plasmas; initial and boundary value problems of gases and plasmas; the hydrodynamical stage.

**Mathematics 70.542** Electromagnetic Theory

Faraday's law of induction for moving bodies; applications to moving charges; vector and scalar potentials; cylindrical distributions and wave guides; radiation and the oscillating dipole; Cartesian tensors; special theory of relativity and electromagnetic phenomena; electromagnetic waves; diffraction theory.

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### Mathematics 70.543 Mathematical Theory of Compressible Flow

Basic equations of inviscid, unsteady, compressible flow; solutions of three-dimensional problems by means of source, doublet and vortex distributions; compressible subsonic flow; hodograph methods and other techniques of linearization; supersonic flow; source distributions, conical flow and characteristic coordinates; hypersonic flow; small disturbance theory with applications; transonic flow.

### Mathematics 70.544 Celestial Mechanics

Hamilton-Jacobi theory; integrals of dynamical systems; perturbation theory; orbit theory; stability; three body problems; dynamics of systems of mass points; selected problems in stellar dynamics.

### Mathematics 70.545 Wave Propagation and Diffraction Theory

Mathematical treatment of wave propagation; scalar and vector waves; the diffraction phenomenon; the general diffraction problem; the solvable problems; the Kirchhoff-Huygens diffraction theory; applications to microwave lenses and interferometer theory.

### Mathematics 70.550 Multivariate Analysis

Multivariate normal distribution, estimation of the mean vector and covariance matrix, partial and multiple correlation coefficients; the  $T^2$  statistic: its distribution and uses; the Behrens-Fisher problem; tests of hypotheses; discriminant functions; Wishart distribution; structure of multivariate observations, principal components, factor analysis.

### Mathematics 70.551 Advanced Probability Theory

The concept of probability; sequences of independent trials; random variables and distribution functions; the law of large numbers; characteristic functions; limit theorems; the theory of infinitely divisible distribution laws; Markov chains; the theory of stochastic processes.

### Mathematics 70.552 Advanced Design of Surveys

Unified theory of sampling from finite populations; development of theory for more complex designs involving multi-stage and multi-phase sampling with unequal probabilities; post-stratification; analytic studies, replicated sampling, rotation sampling; multiple frame surveys; theory and application of k-statistics; selected readings from the current literature.

### Mathematics 70.553 The Analysis of Variance

This course presents the basic mathematical theory of the analysis of variance, estimable functions, Gauss-Markov theorems. Under  $\Omega$  (the basic assumptions) — the canonical forms, distribution of point estimates; confidence ellipsoids, test of hypotheses; higher-way complete layouts, some incomplete layouts, analysis of covariance.

### Mathematics 70.554 Operations Research

Linear programming; integer programming; dynamic programming; non-linear programming; queueing theory; game theory; inventory control problems and simulation techniques.

**Mathematics 70.555** Design of Experiments

Basic experimental design methods and theory; complete factorial experiments; confounding, partial confounding and fractional replication; split-plot experiments; quasi-factorial and incomplete block designs; designs for determining optima.

**Mathematics 70.556** Non-Parametric Methods

Single sample problem; k-sample problem; randomness problems; tolerance regions; most powerful rank tests; methods of obtaining rank tests; non-parametric estimation of real parameters. Power and efficiency of non-parametric tests and estimators; limiting distributions of rank order statistics; Wald-Wolfowitz Limit theorem.

**Mathematics 70.557** Statistical Inference I

Game and decision theory; main theorems of decision theory; sufficient and complete statistics; optimum decision criteria; invariant decision problems; Neyman-Pearson lemma; LMP tests; locally best tests; unbiased and invariant test procedures; confidence sets; sequential decision problems.

**Mathematics 70.580** Seminar in Analysis**Mathematics 70.581** Seminar in Algebra

A survey of the recent results and techniques in algebra, emphasizing the inter-relationships between the subdisciplines.

**Mathematics 70.584** Seminar in Applied Mathematics**Mathematics 70.585** Seminar in Statistics**Mathematics 70.590** Directed Studies — Graduate**Mathematics 70.598** Master's Thesis (1 course)**Mathematics 70.599** Master's Thesis (2 courses)**Mathematics 70.655** Advanced Design of Experiments

An advanced seminar involving reading from the current literature in areas of interest to the student.

**Mathematics 70.657** Statistical Inference II

Invariant probability distributions; groups of transformation; relation between sample and parameter spaces under groups of transformations; measurement model-orbits; the structural model; linear regression model; linear progressive model.

**Mathematics 70.690** Directed Studies — Graduate**Mathematics 70.699** Doctorate Thesis



# Music

Associate Professors  
Sessional Lecturers

John Churchill, William Amtmann  
Arnold Earl, Robert Fleming

The Department offers courses leading to both Pass and Honours degrees in Music, although at the time of the publication of this Calendar the university is still waiting for final agreement from the Department of University Affairs for the establishment of the Honours degree for the year 1969-70 and all statements below on the subject of the Honours degree should be read with this thought in mind. All students are advised to acquaint themselves fully with the situation before proceeding further.

The purpose of these courses is not to train students in the performing aspects of the subject (although active participation in choral and instrumental groups will be strongly recommended as adjuncts to academic study) but rather to promote an intellectual and aesthetic understanding of music as an expression of human cultural activity. The study of musical history and of the techniques and materials of musical creation will form the basis of all study and all students will be encouraged to examine the meanings and motivations of the art and to develop their speculative and critical responses to it in both historical and contemporary contexts.

Students entering First Year who plan to take a Major or Honours in Music are advised to consult the Department as early as possible to plan their courses. General requirements of the Faculty of Arts should also be read carefully.

## Major in Music (B.A.)

Majors in Music will be required to take a minimum of five courses which must include Music 30.160 and Music 30.390. Students who major in music are expected to attain a grade of at least C— in Music 30.160.

Special arrangements will be made for students who wish to propose a combined major.

## Honours in Music (B. Mus.)

The Honours program will consist of nine courses in music of which Music 30.490 will be given double weight in computing the class of degree awarded. Music 30.160 and Music 30.260 must also be included. A grade of at least C— will be required in Music 30.160.

Furthermore, honours students will normally be required:

- a) to pass by the December of their second year an informal reading examination in a modern language (other than English), the choice to depend upon the candidate's special field of study. A second language may be strongly recommended for certain specialist study in individual cases.
- b) to take one or more courses in Art.
- c) to take one or more courses in Philosophy, preferably Philosophy 32.240 (Aesthetics).
- d) to take a 200-level History course.

It is the responsibility of the student to consult the departments concerned as early as possible to ensure that all necessary prerequisites are fulfilled.

Students who wish to propose a combined Honours program must consult the Department. Normally they will be required to take six courses of which Music 30.160 and Music 30.490 must be included, the latter to count as two courses.



## Music

### Music 30.100 Introduction to the Music of Western Civilization

This course will provide a general perspective of musical history from the Renaissance to the present within the context of Western civilization. It will include a consideration of main trends and significant personalities and will also include the structural analysis of important musical forms.

*Texts:* I. Holst, *An ABC of Music*.

A. Copland, *What to listen for in Music*.

Robertson and Stevens, *The Pelican History of Music*, vols. 2 and 3.

*Day Division:* 1969-70 (lectures three hours a week).

J. Churchill

### Music 30.160 Materials and Techniques of Music

A theoretical and practical study of rhythm, melody, harmony, counterpoint and structures. Aural training, keyboard harmony and the writing of music will be studied.

*Text:* Melcher and Warch, *Music for Keyboard Harmony*.

*Prerequisite:* Some keyboard facility (or facility in the guitar may be considered) and permission of the Department.

*Day Division:* 1969-70 (seminars three hours a week).

J. Churchill

### Music 30.200 Analysis of specified works

The detailed study of the following works including their composers and environmental influences:

Machaut:	Mass for Four Voices	Palestrina:	Mass and Motet:
Bach:	Art of Fugue		"Hodie Christus natus est"
Mozart:	Die Zauberflöte	Brahms:	Chamber Music
Mahler:	Symphony No. 8	Strauss:	Till Eulenspiegel
Berg:	Violin Concerto	Stravinsky:	Agon
Somers:	Louis Riel		

*Prerequisite:* Music 30.100 or permission of the Department.

*Day Division:* 1969-70 (lectures three hours a week).

W. Amtmann

### Music 30.230 The Classical and Romantic Period

A survey of Western music from the *style galant*, through Mozart, Haydn, Beethoven and the nineteenth century Romantic composers. Important works and composers will be considered and the social changes which provide their background.

*Prerequisite:* Music 30.100 or permission of the Department.

*Day Division:* 1969-70 (lectures three hours a week).

W. Amtmann

### Music 30.250 Contemporary Music

Music since *Tristan und Isolde* including an examination of all modern idioms such as twelve-tone, jazz, aleatory, pop and electronic music. The survey will include not only the significant European figures but also contemporary Canadian and American composers.

*Prerequisite:* Music 30.100 or permission of the Department.

*Text:* Hansen, *An Introduction to 20th Century Music*.

*Evening Division:* 1969-70 (lectures three hours a week).

Robert Fleming

**Music 30.260** Materials and Techniques of Music

A continuation of Music 30.160. The study will progress to more complicated and advanced stages but will still be based on aural perception and the development of the *chant intérieur*.

*Prerequisite:* Music 30.160 or permission of the Department.

*Text:* R. O. Morris, *Figured Harmony at the Keyboard*.

*Not offered, 1969-70.*

**Music 30.340** Mediaeval, Renaissance and Baroque Music

A survey of European music and its environment from the Middle Ages to the death of Bach and Handel. The rise of the motet, the development of mass and madrigal, the beginning of opera, oratorio, the orchestra and their development to 1750 will be studied.

*Prerequisite:* Music 30.100 or permission of the Department.

*Text:* Robertson and Stevens, *The Pelican History of Music*, vols. 1 & 2.

*Not offered, 1969-70.*

**Music 30.350** Canadian Music

A survey of music in Canada from its earliest beginnings up to the present, relating it closely to its environment at each period.

*Prerequisite:* Music 30.100 or permission of the Department.

*Summer:* 1969 *Evening Division* (lectures six hours a week).

*W. Amtmann*

**Music 30.360** Theory and Composition

A specialized course for students with an aptitude for composition in which basic techniques will be studied and applied.

*Prerequisite:* Permission of the Department.

*Not offered, 1969-70.*

**Music 30.380** Modern Theories of Creative Music Education

A study of the work of Curwen, Kodaly, Bartok, Orff, Suzuki, Britten, Hindemith, Schafer and others in relation to the musical education of children and adults. A portion of the time will be devoted to programmed learning, computer applications in music, and methods of testing musical growth. Field work will be an integral part of the course.

*Prerequisite:* Permission of the Department.

*Evening Division:* 1969-70 (lectures and seminars three hours a week).

*Arnold Earl*

**Music 30.390** Tutorial study

A dissertation on a chosen subject or subjects. Freedom of choice will be allowed in consultation with a member of the Department.

*Prerequisite:* Permission of the Department.

*Day Division:* 1969-70.

*Members of the Department*

**Music 30.460** Advanced Composition including Electronic Composition

Studio work to understand and operate the techniques of aleatory and electronic musical composition.

*Prerequisite:* Permission of the Department.

*Not offered, 1969-70.*

## **Music**

### **Music 30.470** Radio and Television Music Production

Theoretical and practical work to study the administration and production of music programs for radio and television.

*Prerequisite:* Permission of the Department.

*Not offered, 1969-70.*

### **Music 30.480** Musical Criticism and Music Journalism

The study of musical assessment and verbal communication.

*Prerequisite:* Philosophy 32.240 and/or permission of the Department.

*Not offered, 1969-70.*

### **Music 30.490** Advanced tutorial study

*Not offered, 1969-70.*

# Philosophy

Professor; Chairman of  
the Department

Professor

Associate Professors

Assistant Professors

J. C. S. Wernham

Bernard Wand (on leave of absence, 1969-70)

R. S. Talmage, James M. Thompson

J. A. Brook, Stanley G. Clarke, B. I. Egyed (St. Patrick's  
College), Marvin Glass, Andrew Jeffrey,

John W. Leyden, Randal R. A. Marlin

Sessional Lecturer

K. M. Larose

## Major in Philosophy

Majors in Philosophy will take a minimum of six courses in Philosophy. Special arrangements will be made for students proposing a combined major program. All majors will arrange their programs in consultation with the Department.

A student may not major in Philosophy unless he obtains C standing in one of the introductory courses in Philosophy or B standing in Humanities 10.100 or Religion 34.100.

## Honours in Philosophy

The honours program may be entered at the beginning of the First year, or by transfer from the pass course (see p. 13). An Introduction to Philosophy should be taken in the First year.

The honours program will consist of a minimum of eight courses in Philosophy, plus an honours tutorial which will count as two courses. The student's program for the Second year and subsequent years will be planned in consultation with the Department. The following courses will be required: Philosophy 32.205; 32.210; 32.215; 32.220; 32.230; 32.305; 32.490.

With permission of the Department a final year honours student may take either or both of Philosophy 32.520 and Philosophy 32.518.

## Combined Honours

The following combined honours programs are available:

### *English and Philosophy*

In Philosophy: (1) an introductory course; (2) 32.205; 32.220; (3) 32.215; (a) one of 32.210, 32.240, 32.330; or (b) 32.305 or 32.310; (4) 32.491; (a) if not already chosen, or (b). In English: seven courses including those listed under entry of Department of English, p. 162, par. 5.

### *History and Philosophy*

In Philosophy: (1) an introductory course; (2) 32.205; 32.220 or 32.230; (3) 32.215; 32.210 or 32.330; (4) 32.491; 32.305 or another course. In History: (1) 24.115; (2) 24.211 plus another 200 level course; (3) 24.388 plus another 300 level course; (4) 24.490 or another 400 level course.

In each case the remaining courses must be chosen in consultation with the Department so as to satisfy the general Faculty regulations.

Combined honours programs are also available in Philosophy and the following subjects: *French, German, Greek, Mathematics* (see entry of Department of Mathematics), *Political Science, Religion*. Details of these programs may be obtained from the Department.

Honours programs may be taken in which Philosophy is combined with other subjects by arrangement. The minimum requirements in Philosophy will be six courses

## Philosophy

chosen in consultation with the Department plus 32.490 or 32.491. Although 32.491 is the minimum honours tutorial requirement this does not preclude the possibility of choosing 32.490.

### Graduate Studies

The Department of Philosophy offers studies leading to the degree of Master of Arts. For admission to the degree program a student must have an honours degree in Philosophy with at least second class standing, or the equivalent of this. A student who does not already have this requirement will be expected first to complete a qualifying year.

A candidate for the M.A. in Philosophy will (1) take three whole courses or the equivalent (or four, in case his thesis is counted as the equivalent of one course), (2) present a thesis and (3) defend his thesis at an oral examination. One, but not more than one, of the courses taken may (with permission) be an undergraduate course in Philosophy or a graduate or undergraduate course in a related field. Where an undergraduate course is taken the completion of additional assignments may be required. The thesis will normally be counted as the equivalent of two courses. Grades of B or better must be obtained in all courses taken, on the thesis and in the oral examination on the thesis.

A student who works for the M.A. in Philosophy on a part-time basis may be required to pass, with a grade of B or better, a comprehensive examination in Philosophy. Other candidates will not be expected to write a comprehensive examination.

### Philosophy 32.100 Introduction to Philosophy: Religion, Ethics and Inference

In addition to an introduction to traditional and symbolic logic, the course includes treatment of such philosophical questions as the existence of God, the justification of ethical precepts, the meaning of causation and probability and the justifiability of deriving scientific conclusions regarding them from observational evidence.

*Day Division:* Annually (lectures three hours a week).

*S. G. Clarke and R. R. A. Marlin*

*Evening Division:* 1969-70 (lectures two hours and four hours in alternate weeks).

*M. Glass*

*Summer:* 1969 *Evening Division* (lectures five hours a week).

*J. W. Leyden and J. Wolfe*

*Summer:* 1969 *Day Division* (lectures ten hours a week).

*J. W. Leyden and J. Wolfe*

### Philosophy 32.105 Introduction to Philosophy: Philosophical texts

An examination, both historical and critical, of selected philosophical texts. Works to be studied will include: Plato, *The Republic*; Descartes, *Meditations*; Hume, *An Enquiry Concerning Human Understanding*; Ayer, *Language Truth and Logic*, and one other work to be announced.

*Day Division:* Annually (lectures three hours a week).

*A. Jeffrey*

### Philosophy 32.110 Introduction to Philosophy: Knowledge and Logic

Some problems concerning the sources, nature and extent of knowledge will be discussed in the first term. Topics will include: sense-perception; philosophical claims to knowledge of ultimate reality and the positivist critique of metaphysics; the meaning and justification of value judgments. In the second term an introduction to the methods of modern formal logic will be followed by a discussion of certain problems



in the philosophy of science, the central topic being the analysis of explanation in the sciences.

*Day Division:* Annually (lectures three hours a week).

*J. W. Leyden and J. M. Thompson*

### **Philosophy 32.120** Introduction to Philosophy: Reason and Argument

An examination of the nature of controversy and of procedures for help in resolving it by rational means. The course will begin with an introduction to formal logic. Thereafter a variety of extended arguments will be considered. Some of these arguments (about half) will be philosophical; others will be arguments in support of controversial theses in such fields as morals, politics, education and theology.

*Day Division:* Annually (lectures three hours a week).

*R. S. Talmage*

### **Philosophy 32.205** Greek Philosophy

An examination of early speculation in Greece; of the roles of the Sophists and of Socrates; together with a study of selected topics in the works of Plato and Aristotle.

*Prerequisite:* One of Philosophy 32.100, 32.105, 32.110, 32.120, or permission of the Department.

*Day Division:* Annually (lectures and discussion three hours a week).

*A. Jeffrey*

### **Philosophy 32.210** Ethics

A critical analysis of the chief concepts in moral philosophy. In the first term, the moral theories of Hobbes, Butler, Hume, Kant, Bentham and Mill will be examined. The second term, where the emphasis will be on twentieth century writers, will be devoted to such topics as intuitionism, naturalism, emotivism, subjectivism, relativism, freedom and responsibility, act and rule utilitarianism, egoism and supererogation.

*Prerequisite:* One of Philosophy 32.100, 32.105, 32.110, 32.120, or permission of the Department.

*Day Division:* Annually (lectures and discussion three hours a week).

*M. Glass*

### **Philosophy 32.215** Modern Philosophy: 1600-1800

An examination of the major philosophical writers of the seventeenth and eighteenth centuries. Selections will be studied from the works of Descartes, Spinoza, Leibniz; Locke, Berkeley, Hume; and Kant.

*Prerequisite:* One of Philosophy 32.100, 32.105, 32.110, 32.120, or permission of the Department.

*Day Division:* Annually (lectures and discussion three hours a week).

*J. C. S. Wernham*

### **Philosophy 32.220** Philosophical Analysis

A brief account of the history of the movement in its several branches will be followed by careful study of representative samples of analytic philosophy. The readings will be chosen with a view to exhibiting (a) variations in the conception of analysis, and (b) the application of analytic techniques to a variety of philosophical problems.

*Prerequisite:* One of Philosophy 32.100, 32.105, 32.110, 32.120, or permission of the Department.

*Day Division:* Annually (lectures and discussion three hours a week).

*S. G. Clarke*

## Philosophy

### Philosophy 32.230 Logic and Philosophy of Science

A study of truth-functional and quantificational logic will be made, together with an elementary discussion of the nature and properties of formalized systems. This will be followed by an examination of the nature and methods of the empirical sciences, special attention being paid to the role, development and structure of scientific theories and to the nature of scientific explanation.

*Prerequisite:* One of Philosophy 32.100, 32.105, 32.110, 32.120, or permission of the Department.

*Day Division:* Annually (lectures and discussion three hours a week).

*B. I. Egyed and J. W. Leyden*

*Summer:* 1969 *Day Division* (lectures and discussion ten hours a week).

*B. I. Egyed*

### Philosophy 32.240 Aesthetics

Analysis of problems in the description, interpretation and evaluation of works of art, including music, literature and the visual arts; together with the study of types of aesthetic theory.

*Prerequisite:* One of Philosophy 32.100, 32.105, 32.110, 32.120, or permission of the Department.

*Day Division:* Annually (seminar two hours a week).

*J. M. Thompson*

### Philosophy 32.250 Philosophy of Mind

An attempt to answer some of the principal questions of the philosophy of mind. Among the topics to be considered will be belief and thinking, pain and pleasure, imagination, intention, emotion, personal identity, the relations between mind and body, the unconscious, mental illness, telepathy and clairvoyance, and our knowledge of other minds.

*Prerequisite:* One of Philosophy 32.100, 32.105, 32.110, 32.120, or permission of the Department.

*Day Division:* Annually (lectures and discussion two hours a week).

*R. S. Talmage*

### Philosophy 32.260 Philosophy of Religion

An investigation, both historical and systematic, into the relations between faith and reason; together with an examination of the question of the existence and nature of God. Texts to be studied will be representative of mediaeval Scholasticism, German Idealism, Existentialism, and Philosophical Analysis. (This course is also listed as Religion 32.260).

*Prerequisite:* One of Philosophy 32.100, 32.105, 32.110, 32.120, or permission of the Department.

*Day Division:* Annually (seminar two hours a week).

*J. C. S. Wernham*

### Philosophy 32.305 Modern Philosophy: 1800-

An examination of some major philosophical writers of the nineteenth and twentieth centuries; German Idealism from Kant to Hegel; the anti-Hegelian philosophies of Marx, Kierkegaard, Schopenhauer and Nietzsche; evolution and the philosophy of Bergson; American Pragmatism (James, Peirce, Dewey); Whitehead; a brief sketch of recent philosophy.

*Prerequisite:* One of Philosophy 32.100, 32.105, 32.110, 32.120, or permission of the Department.

*Day Division:* Annually (lectures and discussion three hours a week).

*J. M. Thompson*

*Summer: 1969 Evening Division* (lectures and discussion five hours a week).

*K. Larose*

### **Philosophy 32.310** Phenomenology and Existentialism

An examination of recent and contemporary philosophical movements in continental Europe. An account will be given of the historical origins of these movements in the thought of Kierkegaard and Husserl. A comparison will be made between the different treatments of some themes common to contemporary continental European philosophy and Anglo-American philosophy, and an attempt will be made to evaluate them. Special attention will be paid to the philosophy of Sartre. The views of Nietzsche, Heidegger, Jaspers, Scheler, Shestov, Marcel, Merleau-Ponty and Camus, together with some of their commentators, will also be discussed.

*Prerequisite:* One of Philosophy 32.100, 32.105, 32.110, 32.120, or permission of the Department.

*Evening Division:* Annually (lectures and discussion two hours and four hours in alternate weeks).

*R. R. A. Marlin*

### **Philosophy 32.330** Social and Political Philosophy

An analysis of the concepts used to explain and justify social and political thinking or action: state, society, the common good, justice, rights and obligations, punishment and liberty; and a consideration of the moral basis of political obligation.

*Prerequisite:* One of Philosophy 32.100, 32.105, 32.110, 32.120, or permission of the Department.

*Day Division:* Annually (seminar or lectures three hours a week).

*J. A. Brook*

### **Philosophy 32.490** Tutorial

(equivalent of two courses)

### **Philosophy 32.491** Tutorial

(equivalent of one course)

*A. Jeffrey*

## **Graduate Courses**

### **Philosophy 32.506\*** Aristotle

An intensive study of some part of Aristotle's philosophy. (Half course).

In 1969-70: Aristotle's ethics.

*Day Division:* Annually (two hours a week, one term).

*A. Jeffrey*

### **Philosophy 32.511\*** Action, Intention and Responsibility

*Day Division:* Annually (two hours a week, one term). (Half course).

*R. R. A. Marlin*

## **Philosophy**

### **Philosophy 32.516\* Descartes**

An intensive study of selected texts. (Half course).

*Day Division:* Annually (two hours a week, one term).

*J. C. S. Wernham*

### **Philosophy 32.517\* Hume**

An intensive study of selected texts. (Half course).

*Day Division:* Annually (two hours a week, one term).

*Not offered, 1969-70.*

### **Philosophy 32.518\* Kant**

An intensive study of some part of Kant's philosophy. (Half course).

*Day Division:* Annually (two hours a week, first term).

*J. W. Leyden*

### **Philosophy 32.520 Current Problems**

A number of recent books and papers on connected themes will be discussed.

*Day Division:* Annually (seminar two hours a week).

*S. G. Clarke and Members of the Department*

### **Philosophy 32.521\* Perception**

An examination of the principal philosophical theories about perception. (Half course).

*Day Division:* Annually (two hours a week, one term).

*R. S. Talmage*

### **Philosophy 32.531\* Philosophy of Logic**

A detailed examination of some of the philosophical presuppositions of logic, and a discussion of the relevance of symbolic logic to philosophical issues. A working knowledge of quantificational logic will be presupposed. (Half course).

Topics for 1969-70: Propositions, logical truth, inference, quantification and existence, logic and language.

*Day Division:* Annually (two hours a week, one term).

*B. I. Egged*

### **Philosophy 32.541\* Problems in Aesthetics**

In 1969-70, problems in the interpretation of works of art, with particular reference to writers who employ the concept of symbol. (Half course).

*Day Division:* Annually (two hours a week, one term).

*J. M. Thompson*

### **Philosophy 32.590 Graduate Tutorial**

(equivalent of one course)

### **Philosophy 32.591\* Graduate Tutorial**

(equivalent of one half course)

### **Philosophy 32.598 Master's Thesis**

(equivalent of one course)

### **Philosophy 32.599 Master's Thesis**

(equivalent of two courses)

# Physics

Research Professor;  
Acting Chairman of  
the Department  
Professor; Associate  
Chairman  
Professors  
Associate Professors

Assistant Professors  
Visiting Professor  
Sessional Lecturers  
Senior Demonstrators

Demonstrators

Chief Technician

E. P. Hincks  
  
M. K. Sundaresan  
R. L. Clarke, D. Kessler, G. R. Love  
R. D. Barton, A. L. Carter, T. J. S. Cole,  
K. W. Edwards, J. E. Hardy  
D. J. Brown, R. Morrison, L. Resnick  
D. C. Rose  
C. K. Hargrove, F. Szabo  
J. G. Boutin, E. Butterill, R. L. Margeson,  
P. W. R. Sargeant  
A. Buckley, J. G. Cameron, E. Chung, G. Larsson,  
J. Lindsay, L. McIntosh, D. Menagh, F. E. Raney,  
E. Rolfe, G. Sangster  
K. Hafner

Administrative Assistant  
to the Chairman

H. E. Koehler

Students taking a single course in physics should take Physics 75.010 or 75.105. Students taking more than one course in physics should take Physics 75.100. Prerequisites for entry into second year courses are normally Physics 75.100 and Mathematics 69.100. Subject to the recommendation of the major department and the approval of the Physics Department, other combinations of one of Physics 75.100 and 75.105 and one of Mathematics 69.100 and 69.101 may be offered. Prerequisites for the third year courses starting 1969 will normally be Physics 75.211\*, 75.231\*, 75.222\*, and 75.242\*.

## Major in Physics

Typical Pattern (Normal Departmental Requirements)

<i>Year I</i>	<i>Year II</i>	<i>Year III</i>
Physics 75.100	Physics 75.211*, 75.242*	Physics 75.300
Chemistry 65.100	Physics 75.231*, 75.222*	Physics 75.360
Mathematics 69.100	Mathematics 69.205*	Physics 75.381* or
Biology 61.100 or	Mathematics 69.245*	Engineering 95.366*
Geology 67.100	Mathematics 69.215*	Engineering 93.357*
One course in the	Mathematics 69.257*	Mathematics 69.307* and
Humanities or Social	One Humanity or	69.308*
Sciences numbered 100 or	Social Science	One Humanity or
higher chosen with the		Social Science
approval of the Department		

## Honours Course

Typical Pattern (Normal Departmental Requirements)

<i>Year I</i>	<i>Year II</i>
As for Physics Major Course	As for Physics Major Course, but Mathematics 70.200 may be substituted for Mathematics 69.205* and 69.245*



## Physics

### *Year III*

Physics 75.300  
Physics 75.360  
Physics 75.381\*  
Physics 75.388\*  
Engineering 93.357\*  
Engineering 95.366\*  
Mathematics 69.307\* or 70.307\*  
One of Mathematics 69.308\*,  
70.308\*, 69.309\*  
One Humanity or Social Science

### *Year IV*

Physics 75.400  
Physics 75.437\*  
Physics 75.447\*  
Physics 75.458\*  
Physics 75.468\*  
Physics 75.476  
Physics 75.499

During the vacation between Year III and Year IV, students are required to familiarize themselves with a specialized topic; they will deliver a fifty minute talk on that subject during the first term of the Year IV. Comprehensive examinations are given in physics and related mathematics, and the student must submit a thesis on his work carried out in Physics 75.499. The fulfilment of the requirements stated in this paragraph is the responsibility of the student.

### *Combined Honours Course in Mathematics and Physics*

#### Typical Pattern (Normal Departmental Requirements)

### *Year I*

Physics 75.100  
Chemistry 65.100  
Mathematics 69.100  
Biology 61.100 or Geology 67.100  
One course in the Humanities or Social Sciences numbered 100 or higher chosen with the approval of the Department

### *Year II*

Physics 75.211\*, 75.242\*  
Physics 75.231\*, 75.222\*  
Mathematics 70.200  
Mathematics 70.210  
Mathematics 70.245\*  
Mathematics 70.257\*  
One Humanity or Social Science

### *Year III*

Physics 75.307\*  
Physics 75.360  
One of Physics 75.381\*,  
Engineering 93.357\*, 95.366\*  
Physics 75.388\*  
Mathematics 70.300  
Mathematics 70.307\* and 70.308\*  
Mathematics 70.310  
Mathematics 70.341

### *Year IV*

Physics 75.407\*  
Physics 75.437\*  
Physics 75.447\*  
Physics 75.476  
One Mathematics course at the Fourth year level  
Physics 75.499 or Mathematics 70.495\* and another Half Course in Mathematics at the 400 level  
One Mathematics or Physics Course

During Year IV comprehensive examinations are given.

## Graduate Studies

Candidates for the Doctor's and Master's degrees are accepted for full-time work in physics under the supervision of members of the Department. The requirements and general regulations of the Faculty of Graduate Studies are applicable. A Master's degree may be obtained on a part-time basis. Full particulars of the requirements for Graduate Studies may be obtained by writing to the Department.

## Language

Candidates for the degree of Bachelor of Science with Honours in Physics or combined Honours in Mathematics and Physics must show a reading knowledge of French, German, or Russian. Requests for examination should be submitted to the Chairman of the Department by February 15; application for examination is the responsibility of the student. Graduate students are required to satisfy a prescription specified by their Supervisor in consultation with the Department.

## Summer School Offerings

Physics 75.100, Physics 75.317\* and Physics 75.476 will be offered in the 1969 Summer School program (Evening Division). (Physics 75.317\* is being discontinued beginning fall term, 1969-70.)

### Physics 75.010 Pre-University Physics

*Evening Division:* Annually (Lectures two hours a week, laboratory demonstrations and problems two hours a week).

### Physics 75.100 Introductory Physics

This course introduces mechanics, the properties of matter, electricity and magnetism, wave motion, optics, acoustics and some modern topics. A balance is maintained between depth and range.

*Text:* Shortley and Williams, *Elements of Physics*.

*Prerequisites:* Mathematics 69.010 and Mathematics 69.011 or equivalents; Physics 75.010 or permission of the Department.

*Day Division:* Annually (lectures three hours a week, laboratory three hours a week).

### Physics 75.105 Introductory Physics

An alternate first year course for students who lack the prerequisite for Physics 75.100 or who intend to take their major work in a department not requiring Physics 75.100.

*Text:* Baez, *New College Physics*.

*Prerequisite:* Mathematics 69.010 or equivalent.

*Day Division:* Annually (lectures three hours a week, laboratory three hours a week).

### Physics 75.211\* Mechanics and Properties of Matter

Classical mechanics of a particle and rigid body. Classical properties of matter.

*Text:* *Berkeley Physics Course*, Vol. 1.

*Prerequisites:* Physics 75.100, Mathematics 69.100<sup>(1)</sup>.

*Day Division:* Annually (lectures three hours a week, laboratory three hours a week, first term).

### Physics 75.222\* Wave Motion and Optics

Modes of oscillating systems with one, two, and many degrees of freedom. Damped, driven harmonic oscillator. Physical optics based on oscillator model — dispersion, absorption, scattering. Huygen's principle. Reflection and transmission as coherent scattering. Interference, coherence length, diffraction, polarization, double refraction. Geometrical optics is treated briefly in the course but lenses and prisms are studied in the laboratory along with gratings and interferometers.

<sup>(1)</sup>Physics 75.105 and Mathematics 69.101 are also acceptable prerequisites provided a minimum grade of B— is obtained in these courses.

## Physics

*Text:* Crawford, *Waves*.

*Prerequisites:* Physics 75.100, Mathematics 69.100<sup>(1)</sup>.

*Day Division:* Annually (lectures three hours a week and laboratory three hours a week, second term).

*Evening Division:* 1969-70 (lectures three hours a week and laboratory three hours a week, second term).

### Physics 75.230 Electricity and Magnetism

The theory of electric and magnetic fields is covered in some detail as is electro-magnetism and electromagnetic induction. D.C. and A.C. circuit theory is presented and the principles of complex numbers and complex circuit theory are discussed briefly. Conduction in vacuum, and in solid conductors, semi-conductors and insulators is discussed as a preliminary to a brief introduction to vacuum tubes and solid state devices. The laboratory deals primarily with electrical measurements.

*Text:* Kipp, *Electricity and Magnetism* (revised edition).

Laboratory Instructions for Physics 75.230.

*Prerequisites:* Physics 75.100, Mathematics 69.100<sup>(1)</sup>.

*Day Division:* Annually (lectures three hours a week, laboratory three hours a week).

### Physics 75.231\* Electricity and Magnetism

Electrostatics, charges and fields, electric potentials and fields around conductors, magnetic fields, formulated in vector calculus notation. Electric current, fields of moving charges, electromagnetic induction, introduction to Maxwell's equations. Alternating current circuits. Properties of dielectric and magnetic materials.

*Text:* Purcell, *Electricity and Magnetism*.

*Prerequisites:* Physics 75.100, Mathematics 69.100<sup>(1)</sup>.

*Day Division:* Annually (lectures three hours a week, laboratory three hours a week, first term).

*Evening Division:* 1969-70 (lectures three hours a week, laboratory three hours a week, first term).

### Physics 75.242\* Heat and Thermodynamics

Heat, and kinetic theory. Discussion of theory of specific heats and introduction to transport phenomena. Method of thermodynamics and application of laws of thermodynamics.

*Text:* To be announced.

*Prerequisites:* Physics 75.100, Mathematics 69.100<sup>(1)</sup>.

*Day Division:* Annually (lectures three hours a week, laboratory three hours a week, second term).

### Physics 75.300 Third Year Laboratory

The student is expected to complete a small number of projects. These are closely supervised at the beginning of the year, but the student is encouraged to become as independent as possible. Some of the fields for which apparatus is available are: Physical Optics, Optical Spectroscopy, Electronics, Digital Techniques, Nuclear Spectroscopy, Cosmic Rays, Microwaves, Solid State Phenomena, Electrical Measurements.

<sup>(1)</sup>Physics 75.105 and Mathematics 69.101 are also acceptable prerequisites provided a minimum grade of B- is obtained in these courses.

### *Laboratory Techniques*

Basic Technical operations (mechanical, electronics, etc.) used in the design and construction of research apparatus.

*Text:* Barford, *Experimental Measurements: Precision, Error and Truth*.

*Prerequisite:* Permission of the Department.

*Day Division:* Annually (laboratory six hours a week, workshop three hours a week).

### **Physics 75.307\*** Selected Experiments from Physics 75.300

*Text:* Barford, *Experimental Measurements: Precision, Error and Truth*.

*Day Division:* Annually (laboratory three hours a week, both terms).

### **Physics 75.360** Modern Physics

The course is designed to provide a logical transition from classical to modern physics. The determination of the specific charge of ions, Rutherford and Compton scattering, optical and x-ray spectroscopy are examined. Some discussion is given of special relativity and the Schrödinger equation with an introduction to molecular spectra, solid state physics and nuclear physics.

*Text:* Livesey, *Atomic and Nuclear Physics*

*Prerequisites:* Physics 75.211\*, 75.222\*, 75.231\*, 75.242\*; Mathematics 69.205\* and 69.245\*; or permission of the Department.

*Day Division:* Annually, (lectures three hours a week).

### **Physics 75.381\*** Mathematical Physics I

Vector calculus; curvilinear coordinates; irrotational, solenoidal vector fields; theorems of Gauss, Stokes; introductory fluid mechanics, heat conduction; tensors and dyadics; rigid body rotations; coupled systems and normal coordinates.

*Text:* To be announced.

*Prerequisites:* Physics 75.211\*, 75.222\*, 75.231\*, 75.242\*; Mathematics 69.205\* and 69.245\*; or permission of the Department.

*Day Division:* Annually (lectures three hours a week, first term).

### **Physics 75.388\*** Mathematical Physics II

Fourier series and integrals, elementary generalized functions, Green's functions, with applications; scalar and vector potentials; Helmholtz' theorem; boundary value problems. Introduction to the Lagrangian and Hamiltonian formulation of mechanics; variational principles; canonical transformations; Lagrange and Poisson brackets; Hamilton-Jacobi theory; action-angle variables.

*Text:* To be announced.

*Prerequisites:* Physics 75.381\* or Mathematics 69.341 or Mathematics 70.341 (may be taken concurrently).

*Day Division:* Annually (lectures three hours a week, second term).

### **Physics 75.400** Fourth Year Laboratory

*Prerequisite:* Physics 75.300

*Day Division:* Annually (laboratory four hours a week).

### **Physics 75.407\*** Selected Experiments from Physics 75.400

*Prerequisite:* Physics 75.300 or 75.307\*.

*Day Division:* Annually (laboratory three hours a week, both terms).

## Physics

### Physics 75.437\* Electromagnetic Radiation

Electromagnetic wave propagation in a vacuum, dielectric, conductor, and ionized gas. Reflection, refraction, polarization at the plane boundary between two media. Waveguide and transmission line propagation. Dipole and quadrupole radiation fields. Antenna systems.

*Text:* To be announced.

*Prerequisite:* Physics 75.338\* (except for combined honours students).

*Day Division:* Annually (lectures three hours a week, first term).

### Physics 75.447\* Statistical Physics

The course begins with a brief discussion of the application of statistics to physical measurements. This is followed by an elementary study of classical and quantum statistical mechanics. Maxwell-Boltzman, Bose-Einstein, and Fermi-Dirac statistics are derived, and applied in appropriate physical situations. The relation between thermodynamics and statistical mechanics is considered. Kinetic and transport theories are discussed.

*Text:* Desloge, *Statistical Physics*.

*References:* Whittaker and Watson, *The Calculus of Observations*; K. Huang, *Statistical Mechanics*.

*Prerequisite:* Physics 75.341\*.

*Day Division:* Annually (lectures three hours a week, first term).

### Physics 75.458\* Solid State Physics

An introduction to solid state physics. Modern solid state devices and applications.

*Text:* To be announced.

*Prerequisite:* Physics 75.447\*

*Day Division:* Annually (lectures three hours a week, second term).

### Physics 75.468\* Nuclear Physics

The course starts where Physics 75.360 left off; basic facts about nuclei and nuclear forces are discussed in further detail. The passage of charged particles and radiation through matter is described. A detailed study of the alpha and beta instability of nuclei is followed by a discussion of nuclear excited states, gamma emission and internal conversion. Nuclear models are introduced with particular emphasis on the shell model. After a discussion of nuclear reactions, the course is rounded off with a review of particle physics.

*Text:* Enge, *Introduction to Nuclear Physics*, or Segre, *Nuclei and Particles*.

*Prerequisite:* Physics 75.360.

*Day Division:* Annually (lectures three hours a week, second term).

### Physics 75.476 Introduction to Quantum Mechanics

Classical dynamics: Lagrange's and Hamilton's equations and their application to some problems in dynamics. Hamilton's principle. Euler angles, spinning top. Quantum mechanics: Schrödinger and Heisenberg methods are studied in some detail and applied to problems in one and three dimensions. Elements of perturbation theory and simple applications. Elements of scattering theory. Dirac's theory of the electron and its non-relativistic approximation. Special relativity: Lorentz transformations. Invariance of Maxwell's equations under Lorentz transformations.

*Prerequisite:* Physics 75.317\*.

*Day Division:* Annually (lectures three hours a week).



**Physics 75.499** Fourth Year Project

These are advanced projects of an experimental or theoretical nature with an orientation towards research. The presentation of a thesis is required; the fulfilment of this requirement is the responsibility of the student.

*Prerequisite:* Permission of the Department.

*Day Division:* Annually (a minimum of six hours laboratory or private study a week).

**Physics 75.511\*** Classical Mechanics and Theory of Fields

Hamilton's principle. Conservation laws. Canonical transformations. Hamilton-Jacobi theory. Lagrangian formulation of classical field theory.

*Prerequisite:* Permission of the Department.

*Day Division:* Annually (two 1½-hour lectures a week, first term).

**Physics 75.532\*** Classical Electrodynamics

Covariant formulation of electrodynamics. Lenard-Wiechert potentials. Radiation reaction. Plasma Physics, Dispersion relations.

*Prerequisite:* Permission of the Department.

*Day Division:* Annually (two 1½-hour lectures a week, second term).

**Physics 75.541\*** The Fundamental Principles of Statistical Mechanics

Discussions of equilibrium statistical mechanics.

*Prerequisites:* Physics 75.511\*, 75.532\*, 75.570.

*Day Division:* Annually (lectures three hours a week, first term).

**Physics 75.541\*** Non-equilibrium Statistical Mechanics

Boltzmann equation. BBGKY hierarchy. Chapman Enskog theory.

*Prerequisites:* Physics 75.511\*, 75.532\*, 75.570.

*Not offered, 1969-70.*

**Physics 75.551\*** Solid State Physics I

*Not offered, 1969-70.*

**Physics 75.552\*** Solid State Physics II

*Not offered, 1969-70.*

**Physics 75.561\*** Intermediate Nuclear Physics I

The interaction of radiation and high energy particles with matter. Experimental methods of detection and acceleration of particles. Counting statistics.

*Prerequisites:* Physics 75.437\*, 75.468\*, 75.476.

*Day Division:* Annually (lectures three hours a week, first term).

**Physics 75.562\*** Physics of Elementary Particles

A complete survey of the properties of elementary particles from a phenomenological viewpoint. Classification of the particles and of the forces between them. Conservation laws and invariance principles.

*Prerequisites:* Physics 75.561\*, permission of the Department.

*Day Division:* Annually (lectures three hours a week, second term).

## Physics

### **Physics 75.564\*** Intermediate Nuclear Physics II

Nuclear systems, alpha, beta and gamma emission. Shell model, Collective model. Nuclear forces. Reactions and scattering. Neutron physics, Pion physics.

*Prerequisites:* Physics 75.437\*, 75.468\*, 75.476.

*Day Division:* Annually (lectures three hours a week, second term).

### **Physics 75.571\*** Intermediate Quantum Mechanics with Applications

After a review of basic postulates of quantum mechanics, application of quantum mechanics to non-relativistic systems — atoms, molecules and nuclei is the main topic of this course, ending up with Dirac's one particle theory.

*Prerequisite:* Physics 75.476.

*Day Division:* Annually (lectures three hours a week, first term).

### **Physics 75.572\*** Relativistic Quantum Mechanics

The course starts with relativistic wave equations and considers applications of relativistic quantum mechanics and concludes with renormalization problems in quantum electrodynamics.

*Prerequisite:* Physics 75.476.

*Day Division:* Annually (lectures three hours a week, second term).

### **Physics 75.581\*** Methods of Theoretical Physics I

This course and Physics 75.582\* are designed for students who wish to acquire a wide background of mathematical techniques. Lectures and problem work are designed to give a working knowledge of the principal mathematical methods used in advanced Physics. In this part of the course, the following topics are covered: Infinite series, Fourier series and integrals, Laplace transforms, complex variables, generalized functions.

*Prerequisite:* Permission of the Department.

*Day Division:* Annually (lectures three hours a week, first term).

### **Physics 75.582\*** Methods of Theoretical Physics II

This is a continuation of Physics 75.581\*. Topics include group theory, discussions of SU2, SU3 and other symmetry groups, Lorentz group. Integral equations and eigenvalue problems.

*Prerequisite:* Permission of the Department.

*Day Division:* Annually (lectures three hours a week, second term).

### **Physics 75.590** Selected Topics in Physics (M.Sc. level)

During a full course of post-graduate study a student may, with the permission of the Department, take more than one selected topic. In that case each full course in Physics 75.590 will be counted for credit. Not more than one selected topic may be counted for credit in any one academic year.

### **Physics 75.599** Graduate research leading to a Master's degree thesis

### **Physics 75.660** Advanced Nuclear Physics

The following topics are studied: nucleon-nucleon interaction with a detailed study of low and high energy scattering experiments; nuclear models with special emphasis on the shell model and the collective model; nuclear reactions; direct inter-

actions; electromagnetic transitions in nuclei and the experimental determination of level parameters; beta decay; the scattering of electrons and the form factors of nuclei and nucleons.

*Prerequisites:* Physics 75.511\*, 75.532\*, 75.565, 75.570.

*Day Division:* Annually (seminars three hours a week).

**Physics 75.670 Advanced Quantum Mechanics**

An introduction to quantum field theory. The course begins with a discussion of the Poincaré group and its representations. This is followed by an introduction to second quantization, applied in particular to the Dirac and electromagnetic fields. Then the formal theory of scattering (S-matrix theory) is reviewed and applied to simple models. After an introduction to quantum electrodynamics, the course will move on to specialized topics (negotiable).

*Prerequisites:* Physics 75.511\*, 75.532\*, 75.570.

*Day Division:* Annually (lectures three hours a week).

**Physics 75.690 Selected Topics in Physics (Ph.D. level)**

**Physics 75.699 Graduate research leading to a Doctor's degree thesis**

\*An Asterisk attached to a course number indicates a half course.



# Political Science

Professor Emeritus	Frank H. Underhill
Professor; Chairman of the Department	Adam Bromke
Associate Professor;	
Assistant Chairman	George Roseme
Assistant Professor;	
Assistant Chairman,	
St. Patrick's Campus	Frederick Kirk, Jr.
Professors	Douglas G. Anglin (on leave of absence, 1969-70), Bohdan R. Bociurkiw, Pauline Jewett, Peyton V. Lyon, R. O. MacFarlane, Henry B. Mayo, K. D. McRae (on leave of absence, 1969-70), Khayyam Z. Paltiel (on leave of absence, 1969-70), Donald C. Rowat
Associate Professors	Claude Ake, Teresa R. Harmstone, Robert J. Jackson, Harald von Riekhoff, Paul Rosen
Assistant Professors	Jon Alexander, Charles M. Dalfen, G. Bruce Doern, Larry G. Kjos, Willard A. Mullins, John R. Nellis, I. Garth Stevenson, Elliot L. Tepper, Michael S. Whittington, V. S. Wilson
Visiting Professors	Jean F. P. Blondel, David C. Corbett, J. Alexander Corry, Eugene A. Forsey, R. A. MacKay
Sessional Lecturers	Audrey Doerr, D. Wendy Jones, David Watters, Martin Westmacott
Supervisor of Graduate Studies	Teresa R. Harmstone; Assistant, Harald von Riekhoff
Supervisor of Honours	Paul Rosen
Supervisor of Majors	Willard A. Mullins

Ottawa provides a wealth of resources, both in personnel and in research materials, for the student of government, politics, public administration, and international relations. Undergraduates will be assisted in making the fullest use of these unique advantages of the national capital. The Political Science department offers courses in the following fields of study: Canadian Government and Politics; Comparative Institutions and Politics; Public Administration; International Relations; Political Theory and Methodology.

## Major Program (3 Years)

A major in Political Science requires Political Science 47.100 and five or more additional courses in the Department. The Department strongly recommends that Political Science 47.230 and 47.270 be chosen as two of the five additional courses, especially if students are planning to go on to graduate studies.

A combined major, including Political Science, requires Political Science 47.100 and three or more additional courses. Majors are advised to take Mathematics 69.130 and should take a number of courses in related Social Sciences. Final year majors with the required standing may, with permission, be admitted to Fourth year honours courses. The entire program must be approved by the Department.

A major must obtain at least C— in Political Science 47.100 to enter Second year and must maintain an overall average of at least C— in his Political Science courses to continue into Third year. For special supplemental examinations to raise grades (see page 12).



### Honours Programs (4 Years)

The honours programs may be entered in the First year, from First year Honours in the Social Sciences (see p. 27), or by transfer from pass programs, if sufficient standing has been obtained. Only students whose past record indicates the ability to meet the Department's language requirement, and to obtain at least a B— in the Honours Essay will be recommended for fourth year Honours. An honours student may be approved for a pass degree at the end of the Third year if the requirements under the major program have been completed. The following programs are available:

#### *Political Science*

For full honours, nine courses in Political Science will be required, including (a) Political Science 47.100; (b) 47.231; (c) one of 47.210, 47.220, 47.310, 47.320, 47.405; (d) 47.270; (e) one of 47.300, 51.305, 47.340, 47.400, 51.450; (f) 47.498; and three free options, including courses at the 500 level with the permission of the Department. At least one of the courses taken in this program should be a seminar. Candidates present a graduation essay on some topic involving independent investigation; they may be examined orally on this essay and must receive a grade of at least B— for it. They must select a minor field or fields, preferably in Economics, History, Philosophy or Sociology, and by the final year must show a reading knowledge, sufficient for research, of a language other than English, preferably French, German, or Russian. They are advised to take Mathematics 69.130 in their First year.

#### *Combined Honours*

Students intending to enter a program combining Political Science with another discipline should in their First year take Political Science 47.100 and the introductory course in the other discipline. Combined honours require at least six courses in Political Science including 47.100, 47.231, 47.270 (unless an equivalent course is taken in another discipline), one course from sections (c) and (e) of the full honours program described above; two free options. Students must meet the same Fourth year requirements in each department as for single honours, except that the graduation essay may be written for either department and preferably should make use of both disciplines. For combined honours with Philosophy the student must take both Philosophy 32.490 and Political Science 47.498.

At present students may take combined honours in Political Science and either Economics, French, Geography, History, Philosophy or Sociology. Combinations with other subjects will also be considered. All combined honours programs will be arranged so that the student may transfer to full honours in either discipline at the end of the Third year, if he then wishes to specialize more intensively.

### Graduate Programs

The Department offers programs leading to the degrees of Master of Arts and Doctor of Philosophy. Facilities for specialized graduate study and research are currently available in the following fields:

*Political Theory:* historical and analytical.

*Political Institutions:* comparative government—American, European, Soviet, Commonwealth, and African; federalism; political parties, political process, and political sociology.

*Canadian Government:* Federal; provincial and local; constitutional law.

*Public Administration:* Canadian and comparative; administrative law.

*International Relations:* analytical, diplomatic, and institutional; international law; foreign relations of Canada, the United States, and of the Communist and African states.

For the Graduate Diploma in Public Administration and the Master of Arts in Public Administration (see pp. 39-40).

*Master of Arts Program* (full-time or part-time)

**Admission.** Students having an honours degree or the equivalent in Political Science with at least a B standing (g.p.a. of 7.2) may complete the requirements for the M.A. in one academic year. Honour graduates in fields other than Political Science will be considered on the basis of their courses of study and standing. Those with deficiencies may have to take qualifying year or additional courses. Graduates having a pass bachelor's degree in Political Science, with high standing (g.p.a. of 6.8), may be admitted but must complete a qualifying year with an average of at least B standing (g.p.a. of 7.2, with no more than two grades below B— and none below C—) before proceeding to the M.A. year. For further details, consult the Department's Supervisor of Graduate Studies.

*Degree Requirements*

1. An approved number of graduate courses in Political Science (one, or in exceptional cases two, of these may be below the 500 level), including political theory and political inquiry (Political Science 47.270 or its equivalent) if not already taken.
- (a) Five approved courses in Political Science. This option is open only to full-time students on a five-unit pattern, with a high second class average, intending to proceed to the Ph.D., and is to be completed in the academic year.

OR

- (b) Four approved courses in Political Science plus a research essay (Political Science 47.598) tied to one of the courses. This option will be taken primarily by full-time students on a five-unit pattern with normal entrance requirements, and is to be completed in the academic year.

OR

- (c) Three approved courses in Political Science plus a thesis involving original research in an approved field (Political Science 47.599) equivalent to two courses. This option will be taken primarily by part-time students and by full-time students on a six- or seven-unit pattern. If a student has already taken an M.A. degree, including a thesis, in another discipline, he may take two additional graduate courses instead of the thesis.
2. A comprehensive oral examination on approved major and minor fields chosen from the following list: political theory, Canadian government, comparative government, political behaviour and the political process, public administration, international relations. Students may also minor in: public law, provincial and local government (unless the major is Canadian government), Soviet or African studies, an approved field in a related discipline.
3. A reading knowledge, sufficient for research, of an appropriate language other than English, preferably French.
4. At least B standing (g.p.a. of 7.5, with no more than one grade below B— and none below C).

Candidates will be assigned a supervisor who will advise them on their work, including their preparation for the comprehensive and language examinations.

**Doctor of Philosophy** (Full time only)

This program is designed to give selected students a professional qualification in Political Science.

*Admission.* Applications will be considered from outstanding students who have taken the Master of Arts degree or its equivalent in Political Science, Public Administration or International Affairs, with at least high second class standing (g.p.a. of 8.8). Such candidates may be required to take qualifying courses to remedy deficiencies in their background. Other applicants will be expected to take the Master's degree first. All students will be expected to have or acquire an adequate basic knowledge of political theory, political inquiry (Political Science 47.270 or its equivalent), and Canadian government, regardless of their fields of concentration, and an acquaintance with disciplines closely related to Political Science. They will also be expected to take further work in statistics if this is needed for preparation of the thesis. A qualifying examination may be set in one or more fields in order to determine eligibility of admission. For further details consult the Department's Supervisor of Graduate Studies.

*Degree requirements:*

These will entail at least two years of full-time study beyond the Master's degree. The comprehensive examination will normally be taken during the second year.

1. At least three graduate courses, and directed study in accordance with individual needs. The student must complete his courses with at least a high second class average before proceeding to the comprehensive examination.

2. A written and oral comprehensive examination in three approved fields of concentration chosen from the following list.

(1) *Political Theory*: A general knowledge of political theory and analysis, with emphasis on one of the following topics: (a) ancient and mediaeval political thought; (b) the history of political thought from Machiavelli to the present; (c) nineteenth and twentieth century political thought, including recent developments in political analysis.

(2) *Political Institutions and Processes*: A general knowledge of comparative theory and of the political institutions and processes of the major powers, with emphasis on one of the following topics: (a) political parties and the political process; (b) federal and/or local government; (c) comparative government with reference to an approved combination of countries, which must not unduly overlap (5); (d) Canadian Government and Politics, if Canada not chosen under (5).

(3) *International Relations*: A general knowledge of theory, institutions, and world history since 1914, with emphasis on one or more of the following topics: (a) analytical theory; (b) foreign policies of particular states; (c) international institutions and law.

(4) *Public Administration*: A general knowledge of theory and practice with emphasis on at least two of the following topics: (a) theories; (b) Canada; (c) comparative, with reference to an approved combination of countries; (d) administrative law.

(5) *The Politics of a Particular Country or Area*: An intensive study of the political institutions, processes, ideas, and international relations of a single country or area. Students will be expected to be acquainted with the relevant historical, social, and economic aspects of their subject. For the present, approved areas of study are: (a) Britain; (b) The United States; (c) selected Communist countries; (d) Africa, or part of it; (e) Canada.

(6) An approved field in a related discipline may be substituted for (5) above.

Candidates will be expected to pass their comprehensive examination before embarking on the thesis.

3. A thesis written in English or French, and defended orally in English. The oral examination may include matters related to the general field of the thesis. Although

## Political Science

Ottawa is rich in research facilities in some fields, students may pursue their investigations elsewhere when this is advantageous.

4. Language requirements: The ability to read and translate French easily and to converse in French with moderate fluency. This requirement must be met before the comprehensive examination. The oral part of the requirement may be met by successful completion of French 20.201\*. Candidates from outside Canada may be permitted to offer a reading knowledge of another main language in place of French. Candidates must also be able to read a third language appropriate to their program. (In lieu of a third language a candidate may offer a statistics option, Economics 43.220 or Mathematics 69.250 and Computing Science 95.100—this is in addition to the political inquiry course required of all graduates.) This requirement should be met before the comprehensive examination and must be met before the outline of the thesis is approved.

A supervisor and two other advisers will be assigned to each student to advise him on his studies. His whole program must be approved by the Department's Supervisor of Graduate Studies in the light of the student's needs and interests, and the Department's resources.

### First Year

#### **Political Science 47.010** Public Administration for Overseas Students

A special course designed for students taking the Course in Administration for Overseas Public Servants under the auspices of the External Aid Office. Other students from overseas may be admitted with the permission of the instructor.

*Day Division:* 1969-70 (lectures and discussion groups, six hours a week, plus visits and tutorials).

*Audrey Doerr and D. Watters*

#### **Political Science 47.100** Introduction to Political Science

Modern political ideas and institutions, with particular attention to Canada, Britain, and the United States.

*Day Division:* Annually (lectures and discussion three hours a week).

*C. M. Dalfen, R. J. Jackson, G. Roseme and V. S. Wilson*

*Evening Division:* Annually (lectures and discussion three hours a week).

*D. W. Jones and M. Westmacott*

*Summer: 1969 Day Division* (lectures and discussion ten hours a week).

*G. Roseme*

*Summer: 1969 Evening Division* (lectures and discussion five hours a week).

*D. W. Jones*

### Second Year: Majors and Honours

#### **Political Science 47.210** Government and Politics in Western Europe

Britain, France, Western Germany, and other European democracies.

*Prerequisite:* Political Science 47.100.

*Day Division:* 1969-70 (lectures and discussion three hours a week).

*R. J. Jackson and G. Stevenson*

#### **Political Science 47.220** Government and Politics in the United States

American political thought, constitutional development, and the governmental process.

*Prerequisite:* Political Science 47.100.

*Day Division:* 1969-70 (lectures and discussion three hours a week).

*J. Alexander*



## Political Science

### Political Science 47.230 History of Political Thought

The development of Western political theory and related aspects of intellectual history from classical times to the end of the eighteenth century. Readings from Plato, Aristotle, Machiavelli, Bodin, Hobbes, Locke, Rousseau, Burke and others.

*Prerequisite:* Political Science 47.100 or permission of the Department.

*Day Division:* 1969-70 (lectures and discussion three hours a week).

*H. B. Mayo*

*Evening Division:* Annually (lectures and discussion three hours a week).

*P. L. Rosen*

*Summer:* 1969 *Day Division* (lectures and discussion ten hours a week).

*P. L. Rosen*

### Political Science 47.231 History of Political Thought

Same as Political Science 47.230, but at a deeper level, for honours and graduate students in any discipline. An analysis of classical philosophy and its modern form.

*Prerequisite:* Political Science 47.100 or permission of the Department.

*Day Division:* 1969-70 (seminar three hours a week).

*C. Ake*

### Political Science 47.260 International Politics

The structure of the international system: a survey of concepts such as the balance of power, collective security and bipolarization, illustrated by reference to current problems; an introduction to the foreign policies of selected countries.

*Prerequisite:* Political Science 47.100 or permission of the Department.

*Day Division:* 1969-70 (lectures and discussion three hours a week).

*P. V. Lyon*

*Evening Division:* 1969-70 (lectures and discussion three hours a week).

*E. L. Tepper*

*Summer:* 1969 *Evening Division* (lectures and discussion five hours a week).

*A. Bromke*

### Political Science 47.270 Political Inquiry

This course introduces the student to the elements of systematic political analysis. It covers all present modes of inquiry in the discipline, including survey research methods and their statistical background.

*Prerequisite:* Political Science 47.100.

*Day Division:* 1969-70 (lectures two hours a week, laboratory two hours a week).

*C. Ake and L. G. Kjoså*

## Third Year: Majors and Honours

### Political Science 47.300 Canadian Government and Politics

A critical examination of Canadian federalism, parliamentary and bureaucratic institutions, political parties, pressure groups, political behavior, power and leadership.

*Prerequisite:* Completion of first year. (Third year Majors in other disciplines may take this course without having taken Political Science 47.100).

*Day Division:* 1969-70 (lectures and discussion three hours a week).

*M. S. Whittington*

*Evening Division:* 1969-70 (lectures and discussion three hours a week).

*E. A. Forsey*



**Political Science 47.310** The Politics of Developing Areas

The evolution and working of political institutions in the developing countries of Asia and Africa.

*Prerequisites:* Political Science 47.100 and preferably a further course in Political Science.

*Day Division:* 1969-70 (lectures and discussion three hours a week).

*J. R. Nellis*

*Summer: 1969 Evening Division* (lectures and discussion five hours a week).

*J. R. Nellis*

**Political Science 47.320** Soviet Government and Politics

A study of the environment and political culture of the Soviet political system: political socialization, communication, and elite recruitment; the structure and functioning of the Communist Party and governmental institutions; policy making and implementation, capabilities of the Soviet political system.

*Prerequisites:* Political Science 47.100 and preferably a further course in Political Science, or History 24.260.

*Day Division:* 1969-70 (lectures and discussions three hours a week).

*B. R. Bociurkiw*

**Political Science 47.330\*** Politics and Literature

A study of imaginative prose in which political ideas and/or political settings dominate. Literature as political communication. The impact of literature upon politics, the peculiar value of literature in the study of politics; its shortcomings.

*Prerequisites:* Political Science 47.100 and permission of the instructor.

*Day Division:* 1969-70 (lectures and discussion three hours a week, first term).

*G. Roseme*

**Political Science 47.333** Modern Political Thought and Ideology

An analysis of the leading political thinkers and ideologies since 1800. Students are recommended, but not required, to take Political Science 47.230 before taking this course.

*Day Division:* 1969-70 (lectures and discussion three hours a week).

*W. A. Mullins*

**Political Science 47.340** Public Administration

A survey of administrative theory and the functions and responsibilities of the government manager, with particular reference to the federal government of Canada.

*Prerequisites:* Political Science 47.100 and preferably a further course in Political Science.

*Day and Evening Divisions:* 1969-70 (lectures and discussion five hours a week).

*G. B. Doern*

*Summer: 1969 Evening Division* (lectures and discussion five hours a week).

*G. B. Doern*

**Political Science 47.360** Theories of International Relations

The concept of systems in International Relations; functional analysis; game theory; techniques of negotiation and bargaining; problems of personality; integration and disintegration.

*Prerequisite:* Political Science 47.260 or History 24.380.

*Day Division:* 1969-70 (lectures and discussion three hours a week).

*H. von Riekhoff*

## Political Science

The following Third year courses, offered by other Departments may, with the approval of the Department, be counted as Political Science courses for degree requirements:

**Accounting 41.340** Government Accounting and Finance

**Philosophy 32.330** Social and Political Philosophy

**Law 51.300** The Legal Process

**Law 51.305** Introduction to Public Law

**Sociology 53.345\*** Power and Stratification

**Sociology 53.352\*** Political Behavior

## Fourth Year: Honours and Graduate

Third year honours students, and majors with equivalent standing, may with permission of the Department be admitted to these seminars.

### Political Science 47.400 Government of Canada

Student reports on specific topics will be presented and discussed.

*Prerequisites:* Political Science 47.100 and a further course in Political Science.

*Day Division:* 1969-70 (seminar three hours a week).

*G. B. Doern*

*Day and Evening Divisions:* 1969-70 (seminar three hours a week).

*R. O. MacFarlane*

*Evening Division:* 1969-70 (seminar three hours a week).

*I. G. Stevenson, M. S. Whittington and V. S. Wilson*

*Summer:* 1969 *Evening Division* (seminar five hours a week).

*M. S. Whittington*

### Political Science 47.405 Federalism

Contemporary approaches to the problems of federalism in selected countries, with particular reference to Canada.

*Prerequisites:* Political Science 47.100 and a further course in Political Science.

*Day Division:* 1969-70 (seminar three hours a week).

*I. G. Stevenson*

### Political Science 47.410 Political Process in Developed Democracies

A systematic study of the democratic process in Anglo-American and Continental European political systems. Particular emphasis will be directed towards the contributions of behavioral research and the understanding of the interdependent role of parties, pressure groups and electoral systems in linking public opinion to public policy.

*Prerequisites:* Political Science 47.210 and 47.270 are recommended, or permission of the Department.

*Day Division:* 1969-70 (seminar three hours a week).

*F. Kirk and L. G. Kjos*

### Political Science 47.430 Modern Political Thought

The political ideas of selected thinkers: Hamilton, Jefferson, Calhoun, de Tocqueville, Mill, Lincoln, Thoreau, Marx, Weber, Lenin, Orwell, Koestler, Nietzsche, Sorel, Ortega y Gasset, Dewey, Hayek, Arendt, Freud and Marcuse.

*Prerequisite:* Political Science 47.230, or permission of the Department.

*Day Division:* 1969-70 (seminar three hours a week).

*P. L. Rosen*

**Political Science 47.440** Personnel Administration

Includes theories of human relations in management, unionism in the public service, supervision and motivation; the techniques of staffing, pay administration, employee appraisal, performance review and staff development. Lectures, case studies and seminar discussions are used.

*Prerequisite:* Political Science 47.100; and Political Science 47.340 is desirable.

*Evening Division:* 1969-70 (lectures and discussion three hours a week).

*Lecturers to be announced*

**Political Science 47.460** International Institutions

Their origins, structure and functioning, with emphasis on the United Nations.

*Prerequisite:* Political Science 47.260 or History 24.380, or permission of the Department.

*Evening Division:* 1969-70 (seminar three hours a week).

*C. M. Dalfen*

**Political Science 47.470** Political Research Design and Data Analysis

The framing of quantitative research problems, including hypothesis formation and testing, application of models, sampling, scaling techniques, and computer and data processing techniques. Specific application will be made to such fields as voting, legislative, judicial and administrative behavior.

*Prerequisite:* Political Science 47.270 or its equivalent.

*Day Division:* 1969-70 (seminar three hours a week).

*L. G. Kjos*

**Political Science 47.490** Tutorial in a Selected Field

Members of the Department are prepared to give reading courses in political behaviour, the government and politics of the following countries or areas: Britain, Western Germany, the Middle East, or Africa South of the Sahara.

*Day Division:* 1969-70 (tutorial hours arranged).

**Political Science 47.498** Honours Graduation Essay

*Day Division:* tutorial hours arranged.

Canadian Topics, *M. S. Whittington*; Other, as assigned.

The following Fourth year courses, offered by other Departments may, with the approval of the Department, be counted as Political Science courses for degree requirements:

**Law 51.450** Canadian Constitutional Law

**Law 51.463** Public International Law

**Graduate Courses**

Fourth year honours students may, with permission of the Department, be admitted to these seminars.

## Political Science

### **Political Science 47.500\*** Canadian Municipal Government

The problems of Canadian Municipal Government, with special reference to the problems of urban government, the development of metropolitan and regional government, and provincial-municipal relations.

*Day and Evening Divisions:* 1969-70 (seminar three hours a week, first term).

*D. C. Rowat*

### **Political Science 47.501\*** Provincial Government

Problems of government and administration, and of inter-governmental relations.

*Day and Evening Divisions:* 1969-70 (seminar three hours a week, second term).

*R. O. MacFarlane*

### **Political Science 47.502\*** Comparative Local Government

The systems of local government in the United States, Britain and France (which have provided prototypes for many other countries), and systems in other countries, chosen according to the interests of the students.

*Day and Evening Divisions:* 1969-70 (seminar three hours a week, second term).

*D. C. Rowat*

### **Political Science 47.503** Problems in Canadian Government

For 1969-70 the theme will be the law and custom of the Canadian constitution, including the distribution of powers between the federal and the provincial legislatures, and the protections afforded for civil rights. Special attention will be given to the problem of writing a new constitution for Canada, and to the concrete proposals for a rewritten constitution that are now being considered.

*Day Division:* 1969-70 (seminar three hours a week).

*J. A. Corry*

### **Political Science 47.505** Comparative Government

A research seminar dealing in the first term with theories, methods and problems of comparison, and in the second with particular themes.

*Day Division:* 1969-70 (seminar three hours a week).

*J. F. P. Blondel*

### **Political Science 47.510** The Political Process in Canada

An analytical study of the democratic political process, with particular reference to political parties and elections, pressure groups, public opinion, and political leadership in Canada.

*Day Division:* 1969-70 (seminar three hours a week).

*R. J. Jackson and M. S. Whittington*

### **Political Science 47.515** Problems in Communist Politics

A research seminar in selected problems in the politics, government, and society of Communist political systems (the Soviet Union, Eastern Europe and the Asian Communist states). In 1969-70 the emphasis will be on the decision-making process and the operation of social and economic restraints.

*Day and Evening Divisions:* 1969-70 (seminar three hours a week).

*T. R. Harmstone*

**Political Science 47.520 Nationalism**

A historical and comparative study of nationalism, with particular emphasis on its role in the promotion of political change.

*Evening Division:* 1969-70 (seminar three hours a week).

*E. L. Tepper*

**Political Science 47.525 Problems in American Government**

Selected issues of constitutional growth and interpretation; co-operation and conflict in decision-making; recent developments in the Presidency, Congress, electoral behavior, public opinion analysis.

*Day Division:* 1969-70 (seminar three hours a week).

*J. Alexander*

**Political Science 47.530 Analytical Political Theory**

The role of theory in the study of politics and the major concepts used in political analysis. The possibilities and limitations of the historical, institutional, positivist, functional, and behavioral approaches will be emphasized.

*Day Division:* 1969-70 (seminar three hours a week).

*H. B. Mayo and W. A. Mullins*

**Political Science 47.532 Selected Topics in Political Theory**

A seminar on selected areas or problems of political theory. The content of this course may change from year to year; for 1969-70 the first half will concentrate on the concept of ideology and its role in the explanation of political phenomena; the second half will centre upon the relations between philosophy and politics, and problems in the theory of democracy.

*Day Division:* 1969-70 (seminar three hours a week).

*W. A. Mullins and H. B. Mayo*

**Political Science 47.535 The Canadian and American Political Traditions**

*Not offered, 1969-70.*

**Political Science 47.540 Theory and Practice of Administration**

Student reports on specific topics will be presented and discussed. Senior government officials take part in the seminar regularly.

*Evening Division:* 1969-70 (seminar three hours a week).

*R. O. MacFarlane and D. C. Corbett*

**Political Science 47.545 Comparative Public Administration**

The comparative approach to the study of administration; a comparison of public administration under various systems of democratic government, particularly in Europe and the English-speaking world.

*Day and Evening Divisions:* 1969-70 (seminar two hours a week).

*D. C. Rowat*

**Political Science 47.560 Canada in World Affairs**

Canada's external relations with special emphasis on the period since 1939.

*Day and Evening Divisions:* 1969-70 (seminar three hours a week).

*R. A. MacKay*



## Political Science

### **Political Science 47.565** American Foreign Policy

The foreign policy of the United States with special emphasis on trends since the second world war.

*Not offered, '1969-70.*

### **Political Science 47.570** Soviet-American Relations

A comprehensive review of Soviet-American relations since the Second World War, including the role of ideology, the nature of the bipolar system and the emergence of the nuclear stalemate.

*Day and Evening Divisions: 1969-70 (seminar three hours a week).*

*A. Bromke*

### **Political Science 47.580** Africa and Asia in World Affairs

The external relations of African and Asian states.

*Day Division: 1969-70 (seminar three hours a week).*

*T. R. Harmstone and E. L. Tepper*

### **Political Science 47.585** Contemporary International Politics

A comparison of the diplomatic traditions, objectives, sources of influence, and of the decision-making processes of selected developed countries, such as Germany, Britain, France, Denmark, Australia, Poland, Switzerland and Canada.

*Day and Evening Divisions: 1969-70 (seminar three hours a week).*

*P. V. Lyon*

### **Political Science 47.586** Military Strategy and Defence Policy

A study of recent strategic doctrines; civilian-military relations; defence policy decision-making; arms control and disarmament and conflict resolution.

*Day and Evening Divisions: 1969-70 (seminar two and a half hours a week).*

*H. von Riekhoff*

### **Political Science 47.590** Tutorial in a Selected Field

Members of the Department are prepared to give tutorials or reading courses on Political Behavior, Arms Control, Comparative Federalism, and on the government and politics of the following countries or areas: Britain, Western Germany, the Middle East, or Africa South of the Sahara.

*Day Division: 1969-70 (tutorial hours arranged).*

### **Political Science 47.598** Research Essay

For students who write a research essay rather than a thesis.

*Day and Evening Divisions: 1969-70 (tutorial hours arranged).*

### **Political Science 47.599** M.A. Thesis

*Day and Evening Divisions: 1969-70 (tutorial hours arranged).*

### **Political Science 47.699** Ph.D. Thesis

*Day Division: 1969-70 (tutorial hours arranged).*

The following Fifth year courses, offered by other Departments may, with the approval of the Department, be counted as Political Science courses for degree requirements:

**Law 51.555** Administrative Law

**Sociology 53.540\*** Political Sociology

**See also:**

The following courses, though not accepted for Political Science credits, are suggested for their immediate relevance to the discipline.

**Economics 43.220** Statistical Methods in the Social Sciences

**Economics 43.335** Political Economy in the Modern State

**Economics 43.340** Problems of Area Development

**Economics 43.430** Industrial Organization and Public Policy

**Economics 43.440** Public Finance

**Geography 45.440** Political Geography

**Geography 45.530\*** Problems of African Development

**History 24.231** History of Canada

**History 24.260** History of Russia and the U.S.S.R.

**History 24.380** Diplomacy of the Great Powers, 1890-1945

**Sociology 53.200** Social Research

**Sociology 53.300** Sociological Theory

**Sociology 53.320** French Canadian Society

**Sociology 53.440\*** Complex Social Systems

**Sociology 53.525** Canadian Society

**Sociology 53.587\*** Sociology of International Relations



# Psychology

Professor; Chairman  
of the Department  
Professor  
Associate Professors

R. A. Wendt  
P. D. McCormack (on leave of absence, 1969-70)  
Marjorie N. Donald, R. M. Knights, A. B. Laver,  
Marilyn E. Marshall, T. J. Ryan (on leave of absence,  
1969-70), L. H. Strickland, T. N. Tombaugh,  
W. E. Walther, D. W. Zimmerman

Visiting Associate  
Professor  
Assistant Professors

Peter Krausser  
D. K. Bernhardt, Elinor J. Burwell, R. F. Dillan,  
P. A. Fried, R. D. Hoge, D. C. McIntyre, A. Moffitt,  
A. J. Ray, Jr., H. M. Simpson, W. E. Webster,  
R. B. Wells

Sessional Lecturer  
Pre-School Director  
Technician

Jo Tombaugh, F. R. Wake (St. Patrick's College)  
Evelyn Gripton  
H. Burgmann

## Major Program in Psychology

This alternative is intended for the student who is not planning a career as a psychologist, but who wishes a liberal arts education with several courses in psychology. The minimum requirement for a concentration in psychology is six course credits.

Students who decide to train for a career as a psychologist are advised to transfer to the honours program not later than the end of the second year. Students who are considering this possibility should choose courses that are required for honours psychology students in the second year.

The undergraduate courses in Psychology have been designed to allow students a wide choice of subject areas as well as the opportunity to investigate particular content areas in depth. The basic courses are 49.100, 49.200\*, 49.205\*, 49.210\*, 49.220\*, 49.250\*, 49.260\*, 49.270\*, 49.300\*, 49.321\*, 49.330\*. All other courses are more specialized presentations following upon the basic courses.

The departmental requirements for a Major in Psychology are summarized below:

1. 49.100.
2. Six of 49.200\*, 49.205\*, 49.210\*, 49.220\*, 49.250\*, 49.260\*, 49.270\*, 49.300\* or 49.302\*.
3. Two half courses not specified in (2).
4. One additional course credit in Psychology.

A student may not offer more than seven full course credits in Psychology in a Pass B.A. program.

### *Part-time Students*

Part-time students taking courses in psychology are expected to register as degree candidates. The Department cycles courses in psychology in evening and summer school sessions so that a part-time student may complete a B.A. with concentration in psychology in the shortest possible time.

## Honours Program in Psychology

To teach psychology at a university, to practice psychology as a profession, or to conduct independent psychological research, a graduate degree (usually the Ph.D.) is the customary requirement. Several provinces, including Ontario, and many states

## Psychology

have laws which require, in effect, that the individual who would represent himself as a psychologist must have received a Ph.D. in, primarily, psychological studies.

The honours programs in psychology are designed to give students who are preparing for graduate studies in psychology an opportunity to learn and evaluate the foundations of the science. They provide adequate preparation for graduate studies leading to a career in psychology, whatever the student's area of interest.

To enter the program leading to the B.Sc. with Honours in Psychology, a student must offer standing at the Grade 13 or qualifying year level in two experimental sciences (chosen from biology, chemistry and physics) and mathematics (algebra and geometry and trigonometry, or Mathematics A and B, or Mathematics 69.010 and 69.011). The appropriate honours program in psychology for other students with Grade 13 or qualifying year standing (including Mathematics A or Mathematics 69.010) is that leading to the B.A. degree.

With the permission of the Honours Adviser, Department of Psychology, a student registered in an honours program in psychology may take six courses in any year, if he has the required minimum grade.

### *B.A. with Honours in Psychology*

The candidate for a B.A. with Honours in Psychology must offer standing at the First Year level in the Faculty of Arts and nine credits for Psychology courses, with remaining courses optional. (Not more than three optional courses may be in Psychology.) The nine Psychology course credits must include:

1. Psychology 49.100 and 49.498.
2. All of Psychology 49.210\*, 49.220\*, 49.250\*, 49.260\*, and 49.270\*.
3. Either Psychology 49.300\* or 49.302\*.
4. Psychology 49.205\* and either 49.206\* or 49.207\*.
5. Psychology 49.200\* and one of 49.201\*, 49.202\*, or 49.203\*.
6. One of Psychology 49.410, 49.420, 49.450, or 49.470.
7. One additional course credit in Psychology.

### *B.Sc. with Honours in Psychology*

Course requirements for the First year of a B.Sc. program are on p. 52. Psychology 49.100 should be taken as the First year course in the humanities or social sciences. One course must be taken in each of Biology and Chemistry and Physics.

### *Second Year*

1. Psychology 49.205\*, and 49.206\*, or Mathematics 69.215\* and 69.257\*, or Mathematics 69.250. (Students planning to take further courses in Mathematics should select Mathematics 69.215\* and 69.257\*.)
2. Psychology 49.200\* and either 49.201\* or 49.202\*.
3. Psychology 49.250\* and 49.270\*.
4. A course in the humanities or social sciences other than Psychology.
5. A course in Biology, or Mathematics, or Chemistry, chosen with approval of the Department of Psychology.

### *Third Year*

1. Psychology 49.220\* and 49.221\*.
2. Two of Psychology 49.222\*, 49.251\*, 49.255\*, 49.271\*, 49.321\*, and 49.322\*.
3. Optional course.
4. As for Second year (4).
5. As for Second year (5).



*Fourth Year*

1. Psychology 49.420, or 49.450, or 49.470.
2. Optional course in Psychology if Mathematics 69.351 was taken in Third year or is being taken in Fourth year. Otherwise, two of Psychology 49.201\*, 49.202\*, 49.206\*, 49.207\*, 49.303\*, and 49.490\*. (Psychology 49.206\* or an equivalent course in experimental design must be taken.)
3. Psychology 49.300\* and either 49.301\* or 49.302\*.
4. Psychology 49.498.
5. As for Second year (5).

*Notes:*

1. A student registered in the four-year B.A. program with Honours in Psychology may, on request, graduate at the end of the third year of studies, as a B.A. with a sequence in Psychology. (See page 13). He must present standing in Psychology equivalent to that required of a student graduating with a Major in Psychology.
2. A student in a B.A. program with Honours in Psychology must obtain each year the approval of the Department of Psychology for the courses he has selected (including optional courses) before he may complete registration.
3. Optional courses may be in Psychology, or any other subject.

**Graduate Studies***Degree Programs*

The Department offers graduate training in general experimental psychology. Areas of specialization available to the student are determined by graduate course offerings, and the interests and specialities of the staff of the Department. No clinical or other applied programs are offered. Part-time graduate studies are not permitted.

*M.A. Program*

As qualification for admission to the Final year, a student must offer standing in: one course in each of statistics and design of experiments, experimental psychology, learning or motivation, physiological and/or comparative psychology, history and/or systems, and two or three other courses in psychology. A student entering with the equivalent of an Honours B.A. or B.Sc. in psychology will be admitted to the final M.A. year (six half-courses and thesis). Not more than one undergraduate course in psychology may be substituted for two half courses.

Students with less than an Honours B.A. or B.Sc. will be admitted to a Qualifying year designed to allow them to complete the M.A. in one further year of study.

*Ph.D. Program*

The qualification for admission into the Ph.D. program is a Master's degree in Psychology, or equivalent. The student must complete at least two years of full-time formal study and research beyond the Master's degree.

The first Ph.D. year will consist of eight optional half-courses. The second Ph.D. year will consist of four half-courses and 49.699. Ordinarily, optional courses for Ph.D. students will be at the 500 and 600 levels. Students may be encouraged to take supporting additional undergraduate courses in Psychology, or courses in other subjects.

*Special Degree Requirements*

A student must obtain a minimum grade of B— or better in *each* course and half-course to be credited towards graduate degree requirements. A student in the Qualifying year must maintain a minimum *average of* B— in all courses taken in that year.

## Psychology

After the Qualifying M.A. year, a student must work for ten to fifteen hours a week as a teaching or research assistant, as part of his training. The Department will provide support for teaching and research assistants through fellowships, research grants, and stipends.

In addition to satisfying course requirements in his area of specialization, a student must demonstrate competence in statistics, experimental design, and research methods. As his field of concentration demands, he will be required to demonstrate, to the satisfaction of his research supervisor, competence in such areas as computer techniques, electronics, psychometrics, sampling procedures, surgical techniques, or reading comprehension in foreign languages.

Ph.D. students must pass comprehensive examinations, usually given at the end of the first full year of study.

### **Psychology 49.100** Introductory Psychology

The biological basis of and variables affecting individual differences, learning, maturation, sensation and perception. Brief introduction to the concepts of conflict and frustration and their relation to personality and behavior disorders. Social psychology. Methodology and experimentation are stressed as central to the study of behavior. Students will be required to assist in research projects as subjects.

*Text:* Krech, Crutchfield and Livson, *Elements of Psychology*, 2nd edition.

*Day and Evening Divisions:* Four class hours a week.

*W. E. Walther and Members of the Department*

### **Psychology 49.200\*** Foundations of Experimental Psychology

Fundamentals of experimental psychology including variables in research, problems and methods of control, generalization, prediction; basic between and within subject designs, functional and factorial, issues in experimental psychology, such as ethics in research.

*Prerequisite:* Psychology 49.100.

*Day Division:* Lectures and laboratory three hours a week, first term.

*H. M. Simpson*

### **Psychology 49.201\*** Operant Conditioning

Introduction to basic procedures and methods of operant conditioning. Major emphasis placed on laboratory demonstrations of different schedules of reinforcement using the albino rat as subject.

*Prerequisite:* Psychology 49.200\*.

*Day Division:* Lectures and laboratory six hours a week, second term.

*T. N. Tombaugh*

### **Psychology 49.202\*** Experimental Child Psychology

A survey of methodological issues in child psychology. Independent projects will be assigned.

*Prerequisite:* Psychology 49.200\* and 49.250\*.

*Day Division:* Lectures and laboratory six hours a week, second term.

*A. Moffitt*

### **Psychology 49.203\*** Experimental Social Psychology

A survey of methodological issues within social psychology. Independent projects will be assigned.

*Prerequisite:* Psychology 49.200\* and 49.210\*.

*Day Division:* Lectures and laboratory six hours a week, second term.

*R. D. Hoge*

**Psychology 49.205\*** Introduction to Psychological Statistics

Descriptive statistics (frequency distributions, measures of central tendency and variability), probability (binomial and normal distributions), inference (z and t distributions, tests of hypotheses about means and differences between means in large and small samples), non-parametric statistics.

*Prerequisite:* Psychology 49.100 or permission of the instructor.

*Day Division:* Lectures three hours a week, both terms.

*J. Tombaugh* (first term)

*W. E. Webster* (second term)

*Evening Division:* Lectures three hours a week, second term.

*R. F. Dillan*

**Psychology 49.206\*** Analysis of Variance

The F-distribution, one-way analysis of variance, two dimensional within and between subjects designs, higher-dimensional designs, mixed designs and analysis of covariance.

*Prerequisite:* Psychology 49.205\* or 49.205.

*Day Division:* Lectures three hours a week, second term.

*J. Tombaugh*

**Psychology 49.207\*** Correlational Statistics

The measurement of relations amongst variables, regression and accuracy of prediction with regression equations. Variance and correlation. Problems of transformation. Correlational methods.

*Prerequisite:* Psychology 49.205\* or 49.205.

*Day Division:* Lectures three hours a week, second term.

*D. W. Zimmerman*

**Psychology 49.210\*** Introduction to Social Psychology

Introduction to contemporary theory and research in social psychology. Areas covered include attitude structure and change, small groups, and social learning.

*Prerequisite:* Psychology 49.100.

*Day Division:* Lectures two hours a week, discussion one hour a week, first term.

*Evening Division:* Lectures two hours a week, discussion one hour a week, second term.

*M. N. Donald*

**Psychology 49.211\*** Social Problems and Movements

A consideration of the psychological aspects of deviance with particular concern for social and political movements.

*Prerequisite:* Psychology 49.210 or 49.210\*.

*Day Division:* Seminar three hours a week, first term.

*R. B. Wells*

**Psychology 49.212\*** Cognitive Processes in Social Psychology

Examination of current research and theory with respect to those cognitive areas relevant to social behavior. Specific topics will include attitude structure and change, interpersonal perception and language.

*Prerequisite:* Psychology 49.210 or 49.210\*.

*Day Division:* Seminar three hours a week, second term.

*L. H. Strickland*

## **Psychology**

### **Psychology 49.213\* Small Groups**

A survey of small group theory and research. Areas covered will include leadership and group problem solving.

*Prerequisite:* Psychology 49.210 or 49.210\*.

*Not offered, 1969-70.*

### **Psychology 49.220\* Physiological Psychology**

An introduction to the physiological substrates of behavior.

*Prerequisite:* Psychology 49.100.

*Day Division:* Lectures three hours a week, first term.

*W. E. Webster*

### **Psychology 49.221\* Comparative Psychology**

An introduction to the development of behavioral capacity from unicellular organisms to man.

*Prerequisite:* Psychology 49.220\*.

*Day Division:* Lectures three hours a week, second term.

*A. J. Ray*

### **Psychology 49.222\* Sensory Psychology**

The physiological basis of sensation. Topics will include sensory mechanisms, neuropsychological basis of perception and psychological phenomena encountered in the various senses.

*Prerequisite:* Psychology 49.100.

*Day Division:* Lectures three hours a week, first term.

*D. C. McIntyre*

### **Psychology 49.250\* Foundations of Developmental Psychology**

Basic principles of developmental psychology with a concentration on theories and methods.

*Prerequisite:* Psychology 49.100.

*Day Division:* Lectures three hours a week, each term.

*E. J. Burwell*

### **Psychology 49.251\* Psychology of Early Childhood**

Development of the child from birth through the preschool years of life; effect of early experience on later behavior.

*Prerequisite:* Psychology 49.250\*.

*Day Division:* Seminar three hours a week, second term.

*A. Moffitt*

### **Psychology 49.252\* Psychology of Middle Childhood**

Development of the child during the elementary school years.

*Prerequisite:* Psychology 49.250\*.

*Day Division:* Seminar three hours a week, second term.

*E. J. Burwell*

### **Psychology 49.253\* Psychology of Adolescence**

Psychological growth and development from puberty to maturity. (May not count both 49.350 and 49.253\* for credit.)

*Prerequisite:* Psychology 49.250 or 49.250\*.

*Day Division:* Seminar three hours a week, first term.

*D. K. Bernhardt*

**Psychology 49.254\*** Psychology of Maturity and Old Age

The problems of maturity and old age.

*Prerequisite:* Psychology 49.250 or 49.250\*.

*Not offered, 1969-70.*

**Psychology 49.255\*** Exceptional Children

Selected topics concerning exceptional children such as mental retardation, brain damage, physically handicapped, disturbed and gifted children.

*Prerequisite:* Psychology 49.250\* or 49.250 or 49.350.

*Day Division:* Seminar three hours a week, second term.

*R. M. Knights*

**Psychology 49.260\*** Introduction to the Study of Personality

An introduction to the study of personality. Consideration of problems, methods and theories.

*Prerequisite:* Psychology 49.100.

*Day Division:* Lectures three hours a week, first term.

*R. B. Wells*

*Evening Division:* Lectures three hours a week, second term.

*D. K. Bernhardt*

**Psychology 49.261\*** Psychoanalytic Theories

Origin and evaluation of psychoanalytic theories, to include both the orthodox theories and recent developments.

*Prerequisite:* Psychology 49.260\* or 49.250\* or 49.250.

*Day Division:* Seminar three hours a week, first or second term.

*D. K. Bernhardt*

**Psychology 49.262\*** Self Theories

Evaluation of the self theories of personality including the theories of Rogers, Maslow and Allport.

*Prerequisite:* Psychology 49.260\*.

*Day Division:* Seminar three hours a week, second term.

*R. B. Wells*

**Psychology 49.263\*** Investigations in Personality

Selected topics in the area of personality and personality theory.

*Prerequisite:* Psychology 49.260\*.

*Not offered, 1969-70.*

**Psychology 49.264\*** Abnormal Psychology

History of the concept of behavioral abnormality. Theory and selected research dealing with the nature and etiology of behavioral abnormality.

*Prerequisite:* Psychology 49.250\*, 49.250 or 49.260\*, 49.260, 49.261\* or 49.262\* is recommended.

*Day Division:* Seminar three hours a week, first term.

*R. M. Knights*



## Psychology

### **Psychology 49.270\*** Foundations of Learning

Contemporary approaches to the identification of conditions for learning and retention in men and animals, including a survey of issues, methods, and findings.

*Prerequisite:* Psychology 49.100.

*Day Division:* Lectures three hours a week, second term.

*M. E. Marshall*

### **Psychology 49.271\*** Motivation

A survey of the effects of motivational variables on performance, learning and perception. Contemporary theories of motivation.

*Prerequisites:* Psychology 49.100 and 49.270\* or 49.270.

*Day Division:* Seminar three hours a week, second term.

*W. E. Walther*

### **Psychology 49.300\*** Origins of Modern Psychology

The idea of science and its influence on man's conception of himself from Copernicus to Darwin. Scientific and humanistic influences on the emergence of psychology as an independent discipline in the late 19th century.

*Prerequisite:* Psychology 49.100 or permission of the instructor.

*Day Division:* Lectures three hours a week, first term.

*M. E. Marshall*

### **Psychology 49.301\*** Precursors of Psychology

Ideas that shaped the emergence in the modern era of psychology as an independent discipline, as evidenced in man's speculations on his nature and his relations with the universe in certain primitive and ancient cultures and in mediaeval Europe.

*Prerequisite:* Psychology 49.100.

*Day Division:* Lectures three hours a week, second term.

*A. B. Laver*

### **Psychology 49.302\*** Systems of Psychology

Patterns of American psychology since William James. Structuralism and functionalism. The behaviorist revolution, and the influence of Gestalt psychology, psychoanalysis, and operationism. Conditioning, connectionism, and the major neo-behaviorist theories.

*Prerequisite:* Psychology 49.100.

*Day Division:* Lectures three hours a week, second term.

*A. B. Laver*

### **Psychology 49.303\*** Theories and Models in Psychology

Problems of communication, concept formation, and exploration in the social sciences. Relations amongst data, experiments and theory.

*Prerequisite:* Psychology 49.200\* or 49.305.

*Day Division:* Lectures three hours a week, first term.

*P. Krausser*

### **Psychology 49.321\*** Perception

A consideration of data and theory concerning perceptual processes. Such topics as psychophysical methodology, perception of form and space, and perceptual learning will be discussed.

*Prerequisite:* Psychology 49.100.

*Day Division:* Lectures three hours a week, second term.

*P. A. Fried*

**Psychology 49.322\*** Problems in Psychophysics

A discussion of the method, logic and application of various theories in psychophysics as they relate to threshold determination and scaling in the modern treatment of psychophysical problems.

*Prerequisite:* Psychology 49.205\* and 49.321\*.

*Day Division:* Seminar three hours a week, second term.

*R. F. Dillan*

**Psychology 49.331\*** Differential Psychology

A critical review of the evidence respecting human differences derived from analysis of psychological test results. Group differences associated with class, age, race, sex, and nationality. Individual differences as to aptitude, interest, achievement, and personality.

*Prerequisite:* Psychology 49.330\*.

*Day Division:* Seminar three hours a week, second term.

*E. J. Burwell*

**Psychology 49.330\*** Foundations of Testing

An introduction to the use of psychological tests in the measurement of human behavior. The evaluation of tests, and their application to problems of experimental psychology.

*Prerequisite:* Psychology 49.205\* (may be taken concurrently).

*Day Division:* Lectures three hours a week, first term.

*A. B. Laver*

**Psychology 49.332\*** Problems in Test Construction

Selected problems in the design and analysis of psychological tests, with emphasis on statistical approaches to reliability and validity. (May not take both 49.332\* and 49.335 for credit.)

*Prerequisite:* Psychology 49.205 or 49.205\*.

*Day Division:* Seminar three hours a week, second term.

*D. W. Zimmerman*

**Psychology 49.340** Personnel Psychology

Application of psychological theory and techniques to problems of organizational functioning and worker motivation. (Open to Pass B.A. and B. Comm. students only).

*Texts:* Gilmer, *Industrial Psychology*, 2nd edition;

Karn and Gilmer, *Readings in Industrial and Business Psychology*.

*Prerequisite:* Psychology 49.100.

*Day Division:* Lectures three hours a week.

*R. D. Hoge*

**Psychology 49.410** Social Psychology II (Theory and Method)

Classical theories of social psychology, and contemporary research developments. Attitude scaling, survey techniques, and group observation.

*Text:* Jones and Gerard, *Social Psychology*; selected readings.

*Prerequisite:* Psychology 49.210.

*Day Division:* Lectures three hours a week.

*L. H. Strickland*

## Psychology

### **Psychology 49.420** Advanced Physiological Psychology

Examination of classical and recent findings on the role of the nervous system in sensory experience, motivation, and learning. Techniques and phenomena of electrophysiology, central stimulation, ablation, spreading depression, and psychopharmacology will be treated in laboratory demonstrations or exercises.

*Text:* Thompson, *Foundations of Physiological Psychology*.

*Prerequisites:* Psychology 49.220\* and 49.221\* and Biology 61.205.

*Day Division:* Lectures three hours a week.

*P. A. Fried*

### **Psychology 49.450** Experimental Child Psychology

Seminar on various theories of human development and related research. Students will be required to evaluate and replicate research methods used in selected studies.

*Text:* To be announced.

*Prerequisite:* Psychology 49.250.

*Day Division:* Seminar hours to be arranged.

*A. Moffitt*

### **Psychology 49.470** Learning II (Empirical Foundations of Learning)

Specification of empirical variables relevant to classical and simple instrumental conditioning situations. Empirical relations between these variables and theoretical structures elaborated in an attempt to account for their derivation. Capacity of such theories to generate hypotheses about more complex learning phenomena.

*Text:* Hall, *The Psychology of Learning*.

*Prerequisite:* Psychology 49.270.

*Day Division:* Lectures three hours a week, first term. Seminar, second term.

*R. A. Wendt*

### **Psychology 49.490\*** Independent Study

A reading or research course for selected students who wish to investigate a particular topic of interest. Available to third and fourth year students only.

*Prerequisite:* Permission of instructor and Chairman of Department.

*Day Division:* Either term.

*Members of the Department*

### **Psychology 49.498** Thesis for Honours in Psychology

Candidates for honours in psychology will present a thesis, at the end of the fourth year, based on an experimental investigation.

*Day Division:* Tutorial hours to be arranged.

*H. M. Simpson and Members of the Department*

## **Graduate Courses**

Except where noted below, the prerequisite for registering in any M.A. course is registration in the M.A. or Ph.D. program *and* permission of the instructor. Not all courses will be given each year. However, courses will be cycled so that all will be offered within a three-year period.

### **Psychology 49.500\*** Systems of Psychology

An examination of the cultural origins, the substance, and the fate of selected psychological systems and theories of the late 19th and early 20th centuries.

*Day Division:* First Term.

*Marilyn E. Marshall*

**Psychology 49.501\* Problems in the History of Psychology**

A study of one or more selected topics in the history of man's attempt to understand his own nature.

*Day Division:* Second Term.

*A. B. Laver*

**Psychology 49.502\* Psychological Research Areas in Historical Perspective**

A survey of the literature concerning a selected area of research, from prehistoric to modern times.

*Day Division:* First Term.

*F. R. Wake*

**Psychology 49.510\* Research Methods in Social Psychology**

Exposure to and experience with selected research and data analysis techniques of particular relevance for social psychology. Attention is given to sampling, computer analysis of survey data, interaction process analysis, sociometric measurement.

*Day Division:* Second Term.

*M. N. Donald*

**Psychology 49.511\* Theoretical Foundations of Contemporary Social Psychology**

Historically important theories of different types and levels developed in relation to significant issues in social psychology. Consideration is given to important research generated from these theories.

*Not offered, 1969-70.*

**Psychology 49.512\* Cognitive Processes in Social Psychology**

An examination of current research and theory within the cognitive area. Emphasis will be placed on those processes which are affected by social factors. Specific topics might include language development, the relation between thought and language, and concept formation.

*Day Division:* First Term.

*R. D. Hoge*

**Psychology 49.514\* Social Perception**

The development and current status of such areas as (a) socially derived determinants of perception, (b) the perception of persons in the interaction context, and (c) mathematical models of the perception-cognitive process. Both substantive and methodological issues are stressed.

*Day Division:* First Term.

*L. H. Strickland*

**Psychology 49.515\* Small Groups**

Detailed examination of currently important topics in small-group theory and research, e.g., group problem solving, group risk-taking, interaction in the dyad and its relation to learning theory, etc.

*Day Division:* Second Term.

*R. B. Wells*

## Psychology

### **Psychology 49.520\*** Foundations of Physiological Psychology

The anatomical, methodological, neurophysiological and philosophical foundations of physiological psychology. Specific study will then be given to selected neural systems including the emotion/motivation system, the reticular activating system, and the visual system.

*Day Division:* First Term.

*W. E. Webster*

### **Psychology 49.521\*** Central Nervous System and Behavior

Selected topics in physiological psychology. Among these topics will be: consolidation and memory, interhemispheric transfer, electrophysiology of learning, and current physiological theories of learning and behavior.

*Day Division:* Second Term.

*D. C. McIntyre*

### **Psychology 49.525\*** Animal Behavior

A study of the non-plastic and innate modes of adaptation including kinesis, taxes, instincts and other innate response patterns. Related topics such as the influence on behavior of special sensory apparatus or morphological characteristic will also be discussed.

*Not offered, 1969-70.*

### **Psychology 49.526\*** Comparative Psychology

Variable and acquired adaptive mechanisms and their phylogenesis. Topics will include: attachment behavior, social organization, learning abilities, communication and motivation.

*Day Division:* First Term.

*A. J. Ray*

### **Psychology 49.527\*** Psychophysiology

Basic concepts, principles, and methods in psychophysiology with emphasis on the physiological correlates of cognitive processes.

*Day Division:* Second Term.

*H. M. Simpson*

### **Psychology 49.528\*** Methods and Instrumentation in Physiological Psychology

Electrode fabrication, stereotaxic procedures, including electrode and cannulae implants, lesion techniques, electrical stimulation of the brain, recording brain potentials, data analysis, including frequency and wave-form analysis, and techniques of neur-histology will be considered in lectures and practiced in the laboratory.

*Day Division:* Second Term.

*A. J. Ray*

### **Psychology 49.530\*** Sensory Processes

Neuroanatomy and neurophysiology of receptor systems and the related integrative action of the central nervous system. Current theoretical models of sensory function.

*Not offered, 1969-70.*

### **Psychology 49.531\*** Perception

Modern perceptual theory illustrated by intensive review of contemporary empirical studies.

*Day Division:* First Term.

*D. C. McIntyre*



**Psychology 49.540\* Measurement**

Physical, psychophysical, and psychological measurement. The mathematical equation as a statement of relation between two metricised variables. Curve fitting as a method of deriving such equations from empirical data. Goodness of fit, trend differences and applications of equations in theory construction.

*Day Division:* First Term.

*D. W. Zimmerman*

**Psychology 49.541\* Mathematical Models**

The formulation, development, and experimental application of a number of mathematical models in psychology. Most of the required mathematical techniques will be developed rather than assumed so that formal derivations can be understood by a student with a good preparation in algebra.

*Day Division:* Second Term.

*Jo Tombaugh*

**Psychology 49.542\* Correlational Techniques**

Product moment correlation, linear and non-linear regression, point coefficients and other measures of association, partial correlation, multiple correlation, canonical correlation, multiple discriminant analysis, factor analysis.

*Not offered, 1969-70.*

**Psychology 49.545\* Psychometric Methods**

Seminar on representative psychological tests with emphasis on construct validity, use in research, and on theories which guided their development. Students will be trained in the administration and interpretation of selected individual tests.

*Day Division:* First Term.

*Lecturer to be announced*

**Psychology 49.550\* Research Methods in Child Development**

Review and evaluations of widely used research techniques in the study of child behavior. Research methods that require special knowledge or modification when used with children will be emphasized. Laboratory practice will help students to acquire research skills.

*Not offered, 1969-70.*

**Psychology 49.551\* Theories of Child Development**

Diverse major, theoretical positions will be presented and evaluated in terms of research findings. (See also Sociology 53.551\*).

*Day Division:* First Term.

*R. M. Knights and S. Richer, Department of Sociology.*

**Psychology 49.552\* The Psychology of Early Childhood**

Behavioral development during the early stages in acculturation. Topics will include sensory and perceptual processes, motor development, learning, cognitive, social and emotional development.

*Day Division:* First Term.

*A. Moffitt*

## Psychology

### **Psychology 49.553\*** The Psychology of the Exceptional Child

A critical examination of current research with exceptional children, to include the culturally disadvantaged, emotionally disturbed, and brain damaged, as well as the highly creative and highly intelligent.

*Day Division:* First Term.

*R. M. Knights*

### **Psychology 49.561\*** Contemporary Research in Personality

Current controversial issues in personality research and selected research studies in personality development and theory.

*Day Division:* Second Term.

*D. K. Bernhardt*

### **Psychology 49.570\*** Research Methods in Learning

Experimental methods, research design, and instrumentation in the fields of learning, and retention. Emphasis on response definition and measurement, procedures and equipment for monitoring and recording the learning process, instructions, and problems of control.

*Day Division:* Second Term.

*T. N. Tombaugh*

### **Psychology 49.571\*** Classical Conditioning

A comparative review of appetitive and aversive Pavlovian conditioning from its inception to current North American and Russian research.

*Not offered, 1969-70.*

### **Psychology 49.572\*** Instrumental Conditioning

Variables affecting the acquisition, performance, and extinction of free and discrete operant behaviors.

*Day Division:* First Term.

*T. N. Tombaugh*

### **Psychology 49.573\*** Generalization and Discrimination

Variables which influence stimulus and response generalization, generalization gradients, and the acquisition of different responses to different stimuli.

*Not offered, 1969-70.*

### **Psychology 49.574\*** Transfer of Training

Analysis of the facilitating or interfering effects of prior experience upon new learning. Nonspecific as well as specific transfer situations will be included.

*Day Division:* Second Term.

*Marilyn E. Marshall*

### **Psychology 49.575\*** Memory and Retention

A study of the literature on the memorizing process, short and long term retention, and analysis of memory research paradigms.

*Day Division:* First Term.

*R. F. Dillan*

### **Psychology 49.576\*** Problem Solving and Thinking

Complex problem solving, reasoning processes, thinking, and symbolic behavior.

*Day Division:* Second Term.

*R. F. Dillan*

**Psychology 49.580\*** Motivation and Emotion

The various conceptual frameworks through which psychologists have attempted to explain motivated behavior. Emphasis will be placed on the empirical delineation of those variables which determine motivated performance and their relation to other phenomenon, e.g., learning, perceptual, physiological. Methodological consideration will be included where appropriate.

*Day Division:* First Term.

*Not offered, 1969-70.*

**Psychology 49.590\*** Directed Studies

Students may register in this course only under special circumstances. Permission to register and approval of course outline must be obtained from the Graduate Committee.

*Day Division:* Either Term.

*Members of the Department*

**Psychology 49.591\*** Independent Research

Permission to register and approval of research plan must be obtained from the Graduate Committee. This course may be repeated for credit.

*Day Division:* Either Term.

*Members of the Department*

**Psychology 49.599** M.A. Thesis

Four half course credits.

*Day Division.*

*Members of the Department*

The following Seminars are open only to Ph.D. students

**Psychology 49.610\*/611\*** Social Psychology

*L. H. Strickland*

**Psychology 49.620\*/621\*** Physiological Psychology

*P. A. Fried and others*

**Psychology 49.650\*/651\*** Developmental Psychology

*R. M. Knights and others*

**Psychology 49.670\*/671\*** Learning

*T. N. Tombaugh and others*

**Psychology 49.699** Ph.D. Thesis

*Members of the Department*



# Religion

Professor; Chairman  
of the Department  
Professor  
Visiting Professor  
Associate Professors  
Assistant Professors

Cyril G. Williams  
Lawrence M. Read (on leave of absence, 1969-70)  
Robert Dobbie  
David Chung (St. Patrick's College), Robert E. Osborne  
Nalini Devdas, Antonio R. Gualtieri, Ronald L. Nettler,  
Joseph G. Ramisch (St. Patrick's College)  
Katherine Young

Lecturer

The general purpose of courses offered in this department is to promote a sensitive and intellectually mature understanding of the basic ideas and concerns of outstanding religious leaders and movements irrespective of whether these coincide or conflict with individual convictions. Religious writings are studied critically in an attempt to understand their meaning, to grapple with their problems, and to assess their significance both in their original cultural context and for our own situation. As general introduction, students are advised to take Religion 34.100 or 34.120 or both.

## Major in Religion (Three Years)

Majors in Religion will take Religion 34.100, Religion 34.120, and at least three other courses in Religion. Special arrangements will be made for students proposing a combined major program. All majors will arrange their programs in consultation with the Chairman of the Department.

## Honours in Religion (Four Years)

The honours program may be entered at the beginning of the first year or in later years by transfer from the pass course.

The student's program will be planned in consultation with the Chairman of the Department. The program will consist of a minimum of ten courses in Religion: Religion 34.120 and at least two other courses devoted or mainly devoted to the Jewish and Christian traditions; Religion 34.100 and at least two other courses devoted or mainly devoted to other religious traditions; the honours tutorial, Religion 34.490, which will count as two courses; and at least two other courses.

## Combined Honours

Students interested in pursuing an honours program in which Religion is combined with another subject are invited to discuss the matter with the Chairman of the Department of Religion. The minimum requirement in Religion in a combined program will be Religion 34.100; 34.120; 34.492; and four other courses in Religion.

## Religion 34.100 Introduction to World Religions

A survey of eastern religions: Hinduism, Buddhism, Taoism, Confucianism and Shinto. A survey of western religions: Zoroastrianism and Islam. Special attention will be paid to the theological and philosophical teachings of these religions.

*Day and Evening Divisions:* Annually (lecture-discussion periods, three hours a week).

*N. Devdas, R. L. Nettler, C. G. Williams and K. Young*

*Summer:* 1969 *Evening Division* (lecture-discussion five hours a week).

*Day Division* (lecture-discussion ten hours a week).

*K. Young*



## Religion

### Religion 34.120 Origin and Early Development of Judaism and Christianity

A survey of Judaism and Christianity up to the second century A.D. The early history of Israel, the development of Hebrew literature, major concepts of Hebrew religion, the Torah, the great prophets; Jewish sects and literature in the Hellenistic and early Roman periods, including apocalyptic writings and the Dead Sea Scrolls; the early history of Christianity, the teachings of Jesus and the contribution of source and form criticism to the interpretation of the gospels, the life and teaching of Paul, the Johannine writings, the book of Revelation.

*Day Division:* Annually (lecture-discussion periods, three hours a week).

*R. Dobbie and R. E. Osborne*

*Summer:* 1969 *Evening Division* (lectures five hours a week).

*R. Dobbie*

### Religion 34.202 Hindu and Buddhist Texts

A study of some of the great texts (in translation) of Hinduism and Buddhism, including examination of their historical context, analysis of their central religious and philosophical ideas, exploration of their role in shaping and expressing the life of Hindus and Buddhists. The class will usually be conducted in seminar form with emphasis on student discussion and reports.

*Prerequisite:* Religion 34.100 or permission of the Department.

*Day Division:* 1969-70 (two hours a week).

*N. Devdas*

### Religion 34.206 Religions and Philosophies of East Asia

A study of the history and thought of Confucianism, Taoism, Buddhism in China and Japan, Shintoism and Shamanism with intensive readings in their classical and contemporary literature (in translation).

*Prerequisite:* Religion 34.100 or permission of the Department.

*Day Division:* 1969-70 (two hours a week).

*D. Chung*

### Religion 34.208 Islam

An introduction to the Islamic religious tradition. A broad historical survey of the entire tradition including a special study of a few of the most important areas. The subjects chosen for special-study during the year 1969-70 are the following ones: (1) the life and work of Muhammad; (2) aspects of the Islamic intellectual tradition: philosophy, theology and mysticism; (3) basic religious beliefs and practices of the Muslim peoples. The goal throughout will be to achieve an understanding of the ways in which Muslims have articulated, developed and dealt with the major issues and problems in their religious life.

*Prerequisite:* Religion 34.100 or permission of the Department.

*Evening Division:* 1969-70 (two hours a week).

*R. L. Nettler*

### Religion 24.211 Cultural and Intellectual History of the Middle Ages

Commencing with a study of patristic thought and institutions, this course will examine the intellectual and cultural development of medieval Europe. (Offered in the Department of History as History 24.211).

*Day Division:* 1969-70 (three hours a week).

*R. E. Reynolds*

**Religion 34.220 The Hebrew Prophets**

A study of the nature, development and significance of Hebrew prophetism. Psychological aspects of the prophetic experience, including the call, "ecstasy", symbolic actions, and the power of the "word". Investigation of problems such as: the political role of the prophets, relation of the prophets to the cult, distinction of true and false prophets, prediction and fulfillment, compilation of prophetic books. Major attention will be given to the activities and messages of the classical prophets.

*Prerequisite:* Religion 34.120 or permission of the Department.

*Day Division:* 1969-70 (lectures and discussion two hours a week).

*R. Dobbie*

*Summer:* 1969 *Day Division* (lectures and discussion ten hours a week).

*R. Dobbie*

**Religion 34.223 Between the Testaments**

A study of the period from about 400 B.C. to A.D. 100: the history, movements, ideas crucial to the development of Judaism and Christianity, as documented especially in the writings which were not included in the Bible. Consideration of wisdom literature, apocalyptic writings, historical works and Rabbinical literature. Special attention will be given to the Dead Sea Scrolls.

*Prerequisite:* Religion 34.120 or permission of the Department.

*Evening Division:* 1969-70 (lectures and discussion two hours a week).

*R. Dobbie and R. E. Osborne*

**Religion 34.225 The Life and Teachings of Jesus**

The course will be concerned with a systematic study of the available records of the life of Jesus. Class periods will be mainly taken up with free class discussions of successive sections of the gospel parallels of Matthew, Mark and Luke. There will be accompanying lectures and readings on the historical context of the life of Jesus and on the milieu within which the records developed.

*Day Division:* 1969-70 (three hours a week).

*R. E. Osborne*

**Religion 34.230 The Life and Thought of Paul**

Paul's relation to the Old Testament, Rabbinic Judaism, and Hellenism; the mission to the Gentiles; the "mysticism" of Paul; central ideas such as justification by faith, predestination, the Holy Spirit, the Church. Consideration of the situation and message of each of Paul's writings.

*Prerequisite:* Religion 34.120 or permission of the Department.

*Day Division:* 1969-70 (lectures and discussion two hours a week).

*R. E. Osborne*

**Religion 34.240 Judaism and the Jewish People**

The course will survey the history of Judaism and the Jewish People from earliest times to the present day emphasizing the major factors, both external and internal, influencing their development. The Biblical period; prophecy; the second commonwealth; the talmudic era; the golden age in Spain; the medieval Jewish community; the modern period; Zionism; the contemporary scene. The course will also review the basic beliefs and practices of Judaism. Jewish theology and ethics; Jewish mysticism; the thirteen principles of Maimonides; the Synagogue, its rituals and practices; the Jewish home and family; the Jewish holy days, fasts and festivals,

## Religion

dietary laws; marriage and divorce laws; mourning customs; problems, trends and movements in contemporary Judaism.

*Day Division:* 1969-70 (lectures two hours a week).

*R. Dobbie*

### **Religion 32.260** Philosophy of Religion

(Offered in the Department of Philosophy as Philosophy 32.260).

### **Religion 34.280** Trends in Contemporary Theology

A study of the thought of some outstanding twentieth century theologians and a few nineteenth century theologians who strongly influenced them, e.g., Kierkegaard, Schleiermacher, Barth, Bultmann, Tillich, Buber, de Chardin, Bonhoeffer Rahner, Lonergan, Cox, the "death-of-God" theologians.

*Evening Division:* 1969-70 (lectures and discussion two hours a week).

*J. G. Ramisch*

### **Religion 24.314** Church, State and Society from the Reformation to the Present

A study of Christian thought and institutions and their influence on the appearance of nation states and on the growth of modern pluralistic society in Europe and America. (Offered in the Department of History as History 24.314).

*Day and Evening Divisions:* 1969-70 (three hours a week).

*D. G. Bowen*

### **Religion 34.330** Religion and Ethics

A study of the ethical teachings of a number of the great world religions with special attention to Judaism and Christianity and an exploration of the implications of these teachings in the context of modern conditions. Students will be asked to choose, individually or in groups, an area of contemporary ethical concern for more intense investigation; e.g. sexual ethics; drug use; Canadian treatment of Indians, Eskimos and other ethnic minorities; Canadian involvement in peace-keeping operations; Canadian external aid; French-Canadian English-Canadian relations and the ethics of nation building; aspects of business ethics; issues of social and economic conflict; social welfare and human rights.

*Day Division:* 1969-70 (three hours a week).

*A. R. Gualtieri*

### **Religion 34.350** Seminar: The Nature and Destiny of Man

With the participation of members of the faculty from the sciences, social sciences, and humanities as well as religion, a critical examination will be made of present and potential contributions of the various disciplines either in conclusions or methodology to an understanding of the nature of man himself and his appropriate destiny.

*Prerequisite:* Permission of the Department.

*Evening Division:* 1969-70 (two hours a week).

*A. R. Gualtieri* (coordinator)

### **Religion 34.390** Selected Problems in Interpretation

A course conducted either on a tutorial or seminar basis designed to enable advanced students to pursue interests in selected areas of religion.

*Prerequisite:* Permission of the Department.

*Day or Evening Divisions:* 1969-70 (hours to be arranged).

*Members of the Department*

**Religion 34.392** Language Tutorial

A study of a language in which one of the religious traditions has been transmitted.

*Prerequisite:* Permission of the Department.

*Day or Evening Divisions:* 1969-70 (hours to be arranged).

*Members of the Department*

**Religion 34.490** Tutorial

(Equivalent to two courses)

*Prerequisite:* Permission of the Department.

*Day or Evening Divisions:* Annually (hours to be arranged).

*Members of the Department*

**Religion 34.492** Tutorial

(Equivalent to one course)

*Prerequisite:* Permission of the Department.

*Day or Evening Divisions:* Annually (hours to be arranged).

*Members of the Department*





# Russian

Associate Professor;

Chairman of the

Department

Assistant Professors

Lecturer

Sessional Lecturers

G. Melnikov

G. R. Barratt, Emilie Stichling, P. Varnai

B. Medwidsky

G. Belkov, H. van de Lagemaat, A. Lewinson

## Major in Russian

Students may elect Russian as their major, alone or in combination with another subject. A major in Russian normally consists of five courses after Russian 36.100, of which Russian 36.202\* and 36.203\* are compulsory. A combined major will consist of four courses beyond the 100 level. Interested students must consult with the Department as early as possible to plan their program.

## Honours Course

The honours course in Russian is designed to give the students a thorough knowledge of Russian language and literature.

The program consists of nine courses after Russian 36.015, of which Russian 36.415\* is compulsory.

Combined Honours programs designed to meet the needs of students wishing to teach or go on to graduate work are available in French and Russian, German and Russian, or in other combinations subject to departmental approval. Ordinarily, seven courses in each language of a combination are required. Information about additional requirements may be obtained from the Department. General regulations concerning Honours Programs are to be found on pp. 13, 26 and 27. See also p. 174 (French); p. 205 (German). The Department participates in the Soviet and East European Studies program. For a description of the program and information on required and optional courses in Russian see p. 44.

The University's language laboratory provides facilities for drill in aural comprehension. Students may take extra practice periods in open hours. The language laboratory is used in the following courses: Russian 36.015, 36.100. Oral examinations are given in these courses and in Russian 36.201\*, 36.301\*.

The Department is also offering a course in Introductory Ukrainian in the Evening division, which can be taken as an option and is particularly recommended to Majors and Honours in Russian. For a description see listing below.

Majors in Russian are urged to take History 24.260, or equivalent, as one of their options.

## Russian 36.015 Introductory Russian

Introductory course, the aim of which is to ensure an adequate grasp of the mechanics of the language and basic skill in aural comprehension. Reading of texts, and oral practice in the language laboratory.

*Texts:* Stilman-Harkins, *Introductory Russian Grammar*, and others to be announced.

*Day and Evening Divisions:* Annually (four hours a week).

*Members of the Department*

*Summer Session: 1969 Day and Evening Divisions.*

## Russian

### **Russian 36.020** Introductory Scientific Russian

This course is designed to meet the needs of all students of the Faculties of Science, Engineering and Graduate Studies of any year who require a reading knowledge of Russian scientific literature. It will include the essentials of Russian grammar, a basic Russian vocabulary and the reading and translation of technical and scientific texts. No language laboratory.

*Day and Evening Divisions:* 1969-70 (three hours a week).

### **Russian 36.100** Intermediate Russian

Grammar review; composition; oral drill in the language laboratory. Reading of selected poetry and prose.

*Prerequisite:* Russian 36.015, or equivalent.

*Day and Evening Divisions:* Annually (four hours a week).

*Members of the Department*

*Summer Session:* 1969 *Evening Division.*

### **Russian 36.120** Intermediate Scientific Russian

A course for students wishing to improve their command of Scientific Russian. Review of Russian grammar. Reading and translation of advanced technical and scientific texts.

*Prerequisite:* Russian 36.020 or equivalent.

*Evening Division:* 1969-70 (three hours a week).

### **Russian 36.201\*** Russian Conversation

Conversation and discussion of current topics, with special emphasis on everyday Russian. Occasional written work.

*Prerequisite:* Russian 36.100 or permission of the Department (may be taken concurrently with Russian 36.100).

*Day and Evening Divisions:* Annually (two hours a week throughout the year).

### **Russian 36.202\*** Russian Composition

Introduction to prose composition and essay writing. Translation into Russian.

*Prerequisite:* Russian 36.100 or permission of the Department.

*Day and Evening Divisions:* Annually (two hours a week throughout the year).

*Emilie Stichling*

### **Russian 36.203\*** Russian Grammar

A systematic review of Russian grammar. Exercises. A compulsory course for Majors and Honours in Russian.

*Prerequisite:* Russian 36.100 or permission of the Department.

*Day Division:* Annually (two hours a week throughout the year).

### **Russian 36.250** Russian Literature of the 19th Century

A study of representative works from Russian prose, poetry and drama of the period.

*Prerequisite:* Russian 36.100 or equivalent.

*Day or Evening Division:* Annually (three hours a week).

*P. Varnai*

### **Russian Literature in Translation 36.260** Literature of the 19th and 20th Centuries

A study of selected works of Russian and Soviet literature in the general context of European literature and against their social and political background. It will com-

prise works by Pushkin, Lermontov, Gogol, Turgenev, Goncharov, Leo Tolstoy, Dostoevsky, Saltykov-Shchedrin, Chekhov, Gorky, A. Tolstoy, L. Leonov, K. Fedin, M. Sholokhov, Paustovsky, Ehrenburg, Pasternak.

This course is designed as an Arts option for all students wishing to broaden their general knowledge of literature. It will not count as a credit for majors in Russian.  
*No Prerequisite.*

*Day or Evening Division:* 1969-70 (two hours a week).

*G. R. Barratt*

### **Russian 36.301\*** Advanced Oral Russian

An advanced sequel to Russian 36.201\*.

*Prerequisite:* Russian 36.201\* or permission of the Department.

*Day or Evening Division:* Annually (two hours a week throughout the year).

*E. Stichling*

### **Russian 36.302\***, Advanced Russian Composition

An advanced sequel to Russian 36.202\*. Introduction to Stylistics.

*Prerequisite:* Russian 36.202\*.

*Day or Evening Division:* Annually (two hours a week throughout the year).

*E. Stichling*

### **Russian 36.320** Russian Poetry

Emphasis is on poets of the nineteenth and twentieth centuries.

*Prerequisite:* Russian 36.100 or permission of the instructor.

*Day or Evening Division*

*Not offered, 1969-70.*

### **Russian 36.340** Russian Drama

The evolution of Russian drama up to the Soviet theatre. Study of dramatic genres through their principal representatives.

*Prerequisite:* Russian 36.100 or permission of the instructor.

*Day or Evening Division:* 1969-70 (three hours a week).

*G. R. Barratt*

### **Russian 36.360** Russian Literature up to Pushkin

Survey of the Kievan and Muscovite periods. Detailed study of eighteenth century prose and poetry.

*Not offered, 1969-70.*

### **Russian 36.415\*** History of the Russian Language

The historical development of Russian, from Old Church Slavonic to the present. Readings from selected texts.

A compulsory course for Honours in Russian.

*Text:* W. K. Matthews, *Russian Historical Grammar*.

*Prerequisite:* Russian 36.203\* or permission of the Department.

*Day Division:* 1969-70 (two hours a week).

### **Russian 36.430** Russian Prose of the 19th Century

Special emphasis will be given to the works of Turgenev, Tolstoy and Dostoevsky.

*Prerequisite:* A Russian course of the 300 level or permission of the Department.

*Day or Evening Division:* 1969-70 (three hours a week).

*P. Varnai*

## Russian

### **Russian 36.450** Soviet Russian Literature

A study of representative works of the Soviet period, with an introduction to Socialist Realism.

*Prerequisite:* A Russian course of the 300 level or permission of the Department.  
*Not offered, 1969-70.*

### **Russian 36.490\*** Special Subject

Tutorial on topics of Russian literature to be assigned by the instructor in consultation with the student.

*Day Division:* 1969-70.

*Members of the Department*

### **Russian 36.491** Tutorial

As above, but offered for full-course credit with a corresponding enlargement of scope and assignments.

### **Russian 36.499** Honours Essay

An option for final-year honours students.

### **Ukrainian 36.016** Introductory Ukrainian

An introductory course designed to give the students the fundamentals of written and spoken Ukrainian. Grammar, reading and oral practice.

Language laboratory.

*Evening Division:* 1969-70 (lectures and laboratory four hours a week).

Attention is directed to the program and courses in Comparative Literature described on p. 48.

\*An asterisk attached to a course number indicates a half course.

# Sociology and Anthropology

Professor, Chairman  
of the Department  
Professors

Francis G. Vallee  
Muni Frumhartz, John Harp, Z. A. Jordan,  
Bruce A. McFarlane, John A. Porter,  
Victor F. Valentine,

Associate Professors

Hyman Burshtyn, Rodney K. Crook, Gertrude Neuwirth,  
Donald R. Whyte (on leave of absence, 1969-70)

Assistant Professors

Bruce Cox, Dennis P. Forcese, Charles C. Gordon,  
John R. Hofley, C. Stanley Jones, Kathryn T. Molohon,  
Kenneth Mozersky, Stephen Richer, Allan D. Steeves,  
John de Vries, Caryll Wells (St. Patrick's College)

Supervisor of Graduate  
Studies

Dennis P. Forcese

Supervisor of Honours  
and Majors

John R. Hofley (Sociology),  
C. Stanley Jones (Anthropology)

## Major Course

### *Sociology*

Students who major in Sociology are expected to attain a grade of C— or better in one of the introductory courses in Sociology or Anthropology. Their program will normally consist of at least six courses in the major field, including an introductory course, and 53.300 or 53.305 (which are most appropriately taken in the First and Third years, respectively) and at least one additional course at the 300 level. Final-year students with the requisite standing may be given permission to take a course at the 400 level. It is also expected that some work will be taken in related disciplines, the most important of which are: Economics, Geography, History, Political Science, and Psychology. The whole course program is to be worked out in consultation with the Supervisor of Honours and Majors (Sociology) and the student's departmental adviser.

### *Anthropology*

Students who major in Anthropology are expected to attain a grade of C— or better in one of the introductory courses in Sociology or Anthropology. Their program will normally consist of at least six courses in the major field including an introductory course, and 54.310 which are to be taken in the First and Third years respectively and at least one additional course at the 300 level. Final-year students with requisite standing may be given permission to take a course at the 400 level. It is also expected that some work will be taken in related disciplines. The whole course program is to be worked out with the student's departmental adviser to ensure that students wishing to follow either the ethnology or physical streams in anthropology are properly informed on which related disciplines are most appropriate.

All courses in sociology and anthropology may be counted toward a degree in either major program, with the exception that courses in archaeology and physical anthropology will *not* be counted as credits for the sociology major.

### *Combined majors*

A major program combining Sociology with another discipline requires a minimum of four Sociology courses including an introductory course in Sociology or Anthro-



## Sociology and Anthropology

pology and either Sociology 53.300 or 53.305. At least two of the four courses must be at the 300 level. The requirements for a major program combining Anthropology with another discipline are the same as for Sociology, except that the required 300 level course is 54.310. The programs should be worked out in co-operation with the two departments and may well include other requirements additional to those above.

### Honours Courses

Honours programs may be entered from the Honours First year in the Social Sciences (see p. 27) or by transfer from the Major course if the appropriate standing has been attained. Students taking Honours in Sociology or Anthropology are expected to meet the general University regulations governing the degree and to fulfil certain additional requirements depending on the program selected. All honours students must obtain at least B— in their honours essay 53.498 (Sociology), or 54.499 (Anthropology). The essay will be considered as a course in determining a student's final standing. The following programs are available:

#### *Sociology*

The entire selection of courses is to be worked out in close consultation with the Supervisor of Honours and Majors (Sociology) and the student's departmental adviser. Normally, the requirements consist of:

1. Nine courses in Sociology including:

a) An introductory course in Sociology or Anthropology, 53.300 or 53.305, 53.370 and 53.498 (Honours Essay).

b) Five additional courses, at least two of which are at the 300 and 400 levels; one of these must be a seminar at the 4th or 5th year level.

2. A minor consisting of three courses in one of the following: Economics, Geography, History, Philosophy, Political Science or Psychology. (Alternative minors will also be considered.)

#### *Sociology and Political Science*

Students intending to enter this program should take an introductory course in Political Science and/or an introductory course in Sociology or Anthropology in the First year. The choice of courses in subsequent years is subject to the approval of the chairmen of the two departments. Normally, the requirements consist of:

1. At least six courses in each of the two disciplines, including:

a) An introductory course in Political Science, 47.230 or 47.231 and four others to be selected in consultation with the Department of Political Science.

b) An introductory course in Sociology and three or four full courses.

c) Either Sociology 53.370 or Political Science 47.270. (If Sociology 53.370 is not selected then Sociology 53.300 or 53.305 is compulsory.)

d) Political Science 47.498 or Sociology 53.498 in the final year.

2. The language requirements for Honours in Political Science.

The program will be so arranged that the student may transfer to full honours in either of the two fields at the end of the Third year, if he then wishes to specialize more intensively.

*Consideration will also be given to applications for Combined Honours in Sociology and Economics or in Sociology and another related discipline.*

#### *Anthropology*

The entire selection of courses is to be worked out in close consultation with the Supervisor of Honours and Majors (Anthropology) and the student's departmental adviser. Normally, the requirements consist of:

1. Nine courses in Anthropology, including:

- a) an introductory course in Anthropology or Sociology, 54.310, 53.370 and 54.499 (Honours Essay).
- b) Five additional courses, at least three of which are at the 300 and 400 levels.

### Graduate Courses

The Department of Sociology and Anthropology offers studies leading to the degree of Master of Arts, and to the Ph.D. in Sociology.

#### *Master of Arts Program*

A student wishing to enter the M.A. program must have an Honours degree in Sociology (or its equivalent) with at least second class standing. Otherwise, he will ordinarily be expected to take a qualifying year (of five courses designated by the Department) before being admitted to M.A. candidacy.

A candidate for the M.A. in Sociology will (1) take three graduate seminars within the Department or two graduate seminars and a course at the 400 level, (2) write a comprehensive examination in Theory and Methodology, (3) present a thesis, and (4) defend his thesis at an oral examination. Grades of B— or better must be obtained in all of these. The student will also be required to have had training—or, in some other way, to demonstrate his competence—in social research and in statistics before completing his program.

Members of the staff are prepared to supervise theses in the following areas:

Deviant Behaviour	Political Sociology
Family and Kinship	Social Stratification
Mass Communications	Sociology of Education
Native Peoples of Canada	Sociology of Knowledge
Occupations and Professions	Sociology of Work
	Social Psychology

#### *Doctor of Philosophy Program*

To be admitted to the Ph.D. program in Sociology, a candidate must have an M.A. degree in Sociology, with Upper Second class standing in his final M.A. year.

A Ph.D. student will be required to complete a minimum of eight graduate level courses (500 or 600), exclusive of Sociology 53.599 and Sociology 53.699. Five of these eight courses may, at the discretion of the Department, be credits obtained during the final M.A. year. Normally a Ph.D. student will be asked to take more than the minimum number of courses, with a view to advanced studies in 'methodology, theory, and areas of specialization.

The residence period for a Ph.D. student will be two years beyond the M.A. degree. In his first year, a Ph.D. student must take at least three full graduate level courses, two of which must be at the 600 level, exclusive of 53.699.

At the end of his second year of residence, the Ph.D. candidate must write three comprehensive examinations. One examination will be in Theory and Methodology, and there will be an examination in each of two areas of specialization.

To qualify for the degree of Ph.D. in Sociology, a candidate must also complete a dissertation; the candidate must defend his dissertation and related areas in an oral examination.

First class standing must be maintained by the candidate throughout the program.

The general regulations governing graduate studies are set out on pp. 67-69 of this Calendar.

## **Sociology and Anthropology**

### **Sociology 53.100** Introduction to Sociology: General Survey of the Fields of Sociology

An introduction to the basic principles, concepts and methods of sociological study. An examination of the elements of social structure and of social behaviour — social relations, social groups, cultural norms and values, and institutions — against the background of both simple and complex societies.

*Day Division:* Annually (lectures and discussion three hours a week).

*Evening Division:* Annually (lectures and discussion three hours a week).

*Summer: 1969 Evening Division* (lectures and discussion five hours a week).

*Summer: 1969 Day Division* (lectures and discussion ten hours a week).

*Members of the Department*

### **Sociology 53.101** Social Issues

An introduction to sociological concepts and perspectives via an examination of select social issues. The course will focus on two issues: the secular society and the problems of industrialization, economic development and population change.

*Day Division:* 1969-70 (lectures and discussion three hours a week).

*J. Hofley and K. Mozersky*

*Evening Division:* 1969-70 (lectures and discussion three hours a week).

*A. Steeves*

### **Sociology 53.102** Introduction to Sociology: The Development of Social Thought

An introduction to sociology focusing on the development of sociological ideas and theories. Basic concepts will be studied in the context of their historical and theoretical background.

*Not offered, 1969-70.*

### **Anthropology 54.110** Introduction to Anthropology

A survey of the major fields of anthropology: prehistory; man's place in nature; types of culture and social organization and their geographical distribution; culture and personality.

*Day Division:* 1969-70 (lectures and discussion three hours a week).

*B. Cox*

*Evening Division:* 1969-70 (lectures and discussion three hours a week).

*K. Molohon*

### **Sociology 53.200** Social Research

Lectures, seminars, and exercises in sociological method and the techniques of social research.

*Prerequisite:* Introductory course in Sociology or Anthropology.

*Evening Division:* 1969-70 (lectures two hours a week, laboratory one hour as required).

*H. Burshtyn*

### **Sociology 53.205** Sociological Statistics

A study of descriptive and inferential statistics intended to give a critical appreciation of the use of statistics in social research. The course includes descriptive measures, tests of association and independence, and predictive models; emphasis on non-parametric techniques. Interest permitting, an overview of common advanced methods may be included.

*Prerequisite:* Introductory course in Sociology or Anthropology.

*Not offered, 1969-70.*

**Sociology 53.210 Social Psychology**

The study of the relationship between the individual and the social system. Emphasis is on integrating individual and social approaches. How does a group influence psychological processes (attitudes, cognitions, motivations, etc.)? How does an individual influence a group? Group process such as socialization, symbolic interaction, coercion, conformity, leadership, cohesion, etc., will be studied.

*Prerequisite:* Introductory course in Sociology, Anthropology or Psychology, or permission of the instructor.

*Day Division:* 1969-70 (lectures three hours a week).

*Caryll Wells*

**Anthropology 54.225 Prehistoric Anthropology, Cultural and Biological Evolution of Man**

Takes up the physical anthropology and archaeology of the most ancient peoples, the origin of Man, the development of technology and of complex institutions, and the nature of racial differences from an evolutionary point of view.

*Evening Division:* 1969-70 (lectures two hours a week).

*Lecturer to be announced*

**Anthropology 54.230 Social Systems of Non-Western Societies**

A study of social anthropology with an emphasis on cross-cultural comparisons of a sample of world societies in terms of kinship, political, economic, religious and symbolic systems.

*Prerequisite:* Introductory course in Sociology or Anthropology or permission of the instructor.

*Day Division:* 1969-70 (lectures two hours a week).

*Lecturer to be announced*

**Sociology 53.240 The Primary Group**

An examination of small face-to-face groups and their relationship to the social structure of the larger society. Examples of groups to be covered are children's play groups, juvenile gangs, industrial work groups.

*Prerequisite:* Introductory course in Sociology or Anthropology.

*Not offered, 1969-70.*

**Sociology 53.241 Kinship, Marriage and the Family**

The course will entail a cross-cultural analysis of kinship and kin groups, an examination of the historical development of the family in western society, and a general survey of contemporary family life and its relationship to the total society.

*Prerequisite:* Introductory course in Sociology or Anthropology or permission of the Department.

*Not offered, 1969-70 at the Rideau River campus.*

(This course is offered 1969-70 in the Department of Sociology at the St. Patrick's campus as Sociology 08.241).

**Sociology 53.245 The Sociology of Work: Occupations and Professions**

A study of the sociological aspects of work, with particular emphasis on the historical development and contemporary organization of occupations and professions, career patterns and recruitment; and manpower problems in developed and developing countries.

*Prerequisite:* Introductory course in Sociology or Anthropology.

*Evening Division:* 1969-70 (lectures and discussion three hours a week).

*B. A. McFarlane*



## Sociology and Anthropology

### **Sociology 53.246\*** Industrial Sociology

An inquiry into the development, structure and prospects for industrial society, and post-industrial society: including the relation of industrial institutions to the rest of the society, and of the internal organization of industrial institutions, including problems of management, labor and union relations.

*Prerequisite:* Introductory course in Sociology or Anthropology or permission of the instructor.

*Day Division:* 1969-70 (lectures and discussion three hours a week, first term).

*C. C. Gordon*

### **Sociology 53.251\* (53.250)** Population Problems

A study of the basic principles and concepts of demography and their historical development, an examination of the basic methods and techniques of demographic analysis, and a review of the interrelations among demographic, socio-cultural, economic and political factors and their implications for social change. Some attention will be paid to the development of skills in carrying out demographic research.

*Prerequisite:* Introductory course in Sociology or Anthropology or permission of the instructor.

*Day Division:* 1969-70 (lectures and discussion three hours a week, second term).

*K. Mozersky*

### **Sociology 53.255\*** Sociology of Deviance

An analysis of the relation of deviant behaviour to the functioning of social systems: conditions and types of deviance from the institutional order, the evasion of rules, the social roles of deviants, the structure of control, punishment and cure.

*Prerequisite:* Introductory course in Sociology or Anthropology or permission of the instructor.

*Day Division:* 1969-70 (lectures and discussion three hours a week, second term).

*H. Burshtyn*

### **Sociology 53.300** Sociological Theory

A study of the development of sociological theory. The various approaches to theory will be examined under the following headings: theory building and research; nature of Man and Society; organicism, evolutionism and neo-evolutionism; symbolic interactionism; structural functionalism; human exchange and utopianism.

*Prerequisite:* Introductory course in Sociology or Anthropology and Third-year standing.

*Evening Division:* 1969-70 (lectures and discussion three hours a week).

*J. R. Hofley*

### **Sociology 53.305** The Sociological Tradition

An examination of the social and intellectual context which has shaped the development and concerns of modern sociology. Particular attention is paid to the works of Marx, Durkheim and Weber and to their subsequent influence on sociological theory and research.

*Prerequisite:* Introductory course in Sociology or Anthropology and Third-year standing.

*Day Division:* 1969-70 (lectures and discussion three hours a week).

*G. Neuwirth*



**Anthropology 54.310** Theory and Methodology in Anthropology

A consideration of the nature of anthropological theory and of explanation in the anthropological context. Some attention will be devoted to previous formulations relevant to contemporary anthropology, but the emphasis will be on the contemporary formulation of culturology, ecological determinism, evolutionism and structural-functionalism. Special attention will be given to the interdependence of theory and methods of research.

*Prerequisite:* Introductory course in Anthropology or Sociology, or permission of the instructor.

*Day Division:* 1969-70 (lectures and discussion three hours a week).

*C. S. Jones*

**Sociology 53.315** Sociology of Education

The course consists of two parts:

(i) an examination of the interplay between educational institutions and other societal institutions. Of specific interest will be the relationship between schools and religious institutions, schools and the business sector, and schools and the family, (ii) an examination of the effects of educational systems on individual behaviour and attitudes. Organizational aspects of schools and attributes of teachers and of students which are relevant in shaping student behaviour will be considered.

*Prerequisite:* Introductory course in Sociology or Anthropology, or permission of the instructor.

*Evening Division:* 1969-70 (lectures and discussion three hours a week).

*S. Richer*

**Sociology 53.320** French Canadian Society

An analysis of the French Canadian way of life, including politics, religion, social structure, cultural values, and literature. Consideration is given both to historical developments and to the contemporary situation.

*Prerequisite:* Introductory course in Sociology or Anthropology or permission of the instructor.

*Day Division:* 1969-70 (lectures and discussion three hours a week).

*Lecturer to be announced*

**Sociology 53.325\*** Race and Ethnic Group Relations

A study of ethnic structure and intergroup processes in 'plural' societies. The focus will be on Canada, but in comparative perspective.

*Prerequisite:* Introductory course in Sociology or Anthropology.

*Day Division:* 1969-70 (lectures and discussion three hours a week, first term).

*Lecturer to be announced*

**Anthropology 45.330** Developing Nations of Inter-tropical Africa

(Offered in the Department of Geography as Geography 45.330).

**Sociology 53.340** Conflict and Society

An examination of the dialectics of individual and social phenomena; the bases, manifestations and consequences of conflict in everyday life; ways of eliminating and synthesizing sources of conflict; the strain toward group cohesion and societal integration.

*Prerequisites:* Introductory course in Sociology or Anthropology and permission of the instructor.

*Not offered, 1969-70.*

## **Sociology and Anthropology**

### **Sociology 53.345\* Power and Stratification**

A cross-cultural study of relations among political, economic and social power; the theories of elites, oligarchies and ruling minorities; bureaucracy and social power; criteria of social class and behaviour.

*Prerequisite:* Introductory course in Sociology or Anthropology or permission of the instructor.

*Day Division:* 1969-70 (lectures and discussion three hours a week, first term).

*A. Steeves*

### **Sociology 53.352\* Political Behaviour**

An examination of sociological contributions to the study of political behaviour and of the relations between politics and the social structure. Some special attention will be paid to comparative structures of political systems.

*Prerequisite:* Introductory course in Sociology or Anthropology, or permission of the instructor.

*Day Division:* 1969-70 (lectures and discussion two hours a week, second term).

*D. Forcese*

### **Sociology 53.360 Social Change and Modernization**

Comparative analysis of social change with particular emphasis on the processes associated with industrialization, and their impact on social structure. Problems of internal and external obstacles to modernization, the relations of different social groups to economic development, the structure of innovation and the role of élites, political unification, nationalism and ideology.

*Prerequisite:* Introductory course in Sociology or Anthropology or permission of the instructor.

*Day Division:* 1969-70 (lectures three hours a week).

*J. de Vries and A. Steeves*

### **Anthropology 54.362\* Contemporary Societies of Africa**

Anthropological perspectives in the study of contemporary African culture: special attention will be paid to the processes of detribalization and urbanization.

*Prerequisite:* Introductory course in Anthropology or Sociology, or permission of the instructor.

*Not offered, 1969-70.*

### **Sociology 53.370 Research Methods and Statistics**

Study of descriptive and inferential statistical techniques used in the Social Sciences. Special attention will be directed to these analytical techniques in relation to data collection procedures in Sociology.

*Prerequisite:* Compulsory for Honours Students, otherwise, permission of instructor.

*Day Division:* 1969-70 (lectures three hours a week).

*J. de Vries*

### **Anthropology 54.371\* Anthropological Linguistics**

A review of theory and methods of anthropological linguistics. Emphasis will be on the interdependence among language, and culture. The study is undertaken on a comparative basis and includes both preliterate and literate groups.

*Prerequisite:* Introductory course in Anthropology or Sociology, or permission of the instructor.

*Day Division:* 1969-70 (lectures, laboratories and discussion three hours a week, first term).

*C. S. Jones*

**Anthropology 54.372\*** Psychological Anthropology

A cross-cultural study of certain psychological processes such as cognition, learning and perception; an examination of the interdependence between culture and personality.

*Prerequisite:* Introductory course in Anthropology or Sociology, or permission of the instructor.

*Day Division:* 1969-70 (lectures and discussion three hours a week, second term).

*K. Molohon*

**Sociology 53.400** Sociological Analysis

An examination of the process of formulating research questions, and of selected techniques in the generation and analysis of data.

*Prerequisites:* Sociology 53.205 or equivalent, final-year Honours standing or permission of instructor.

*Not offered, 1969-70.*

**Anthropology 54.430** Culture and Communication

A study of animal and human communication (verbal and non-verbal) systems; the relation of these to other social and cultural phenomena. Contrasts between oral and written traditions, between myth in non-literate societies and mass media in urban societies, and the content of contemporary "popular culture" are examined.

*Prerequisite:* Permission of the instructor.

*Day Division:* 1969-70 (lectures and discussion three hours a week).

*V. F. Valentine*

**Sociology 53.440\*** Complex Organization I

An examination of formal organizations from the standpoint of theories of organization, sociological theories in other fields as they apply to organizations, as well as relevant research.

*Prerequisite:* Permission of the instructor.

*Day Division:* 1969-70 (seminar two hours a week, first term).

*C. C. Gordon*

**Sociology 53.441\*** Complex Organization II

An examination of the formal structure and bureaucratic organization of the systems of modern society — industry and work, the labour movement, government and politics, education and leisure.

*Prerequisite:* Final-year Honours standing or permission of the instructor.

*Evening Division:* 1969-70 (seminar two hours a week, second term).

*C. C. Gordon*

**Sociology 53.445\*** The Study of Total Societies

An examination of modern societies as total systems, with particular reference to their more significant modes of variation. Consideration is given both to the available theoretical models and to selected empirical cases.

*Prerequisite:* Final year Honours standing or permission of the instructor.

*Day Division:* 1969-70 (seminar two hours a week, first term).

*M. Frumhartz*

**Sociology 53.450\*** Advanced Research Methodology

A detailed examination of selected methodological problems in social research.

*Prerequisite:* Sociology 53.200, 53.400 or its equivalent.

*Not offered, 1969-70.*

## **Sociology and Anthropology**

### **Sociology 53.455\* Urban Studies**

An examination of various theories of urban growth and development, including works of human ecologists, planners and sociologists. Attention will also be given to a comparative analysis of cities and to the problems with which the Western city is confronted today.

*Prerequisite:* Final-year Honours standing or permission of the instructor.

*Day Division:* 1969-70 (seminar two hours a week, first term).

*K. Mozersky*

### **Sociology 53.460\* Medical Sociology**

Seminar on selected topics in medical sociology. In 1969-70, the focus will be on the sociology of mental illness. Included among the topics examined will be problems in definition, classification and diagnosis; epidemiological methods and the interpretation of epidemiological findings; etiological theories; attitudes towards, and societal reactions to mental illness; therapeutic relationships; mental hospitals as organizations.

*Prerequisite:* Final-year Honours standing or permission of the instructor.

*Day Division:* 1969-70 (seminar two hours a week, first term).

*H. Burshtyn*

### **Anthropology 54.470 Indians and Eskimos of North America**

A survey of the prehistory, physical and cultural characteristics of Indian and Eskimo people. Social and cultural changes and the contemporary situation will be studied, with special emphasis on groups in the northern part of North America.

*Prerequisite:* Final-year Honours standing or permission of the instructor.

*Day Division:* 1969-70 (lectures and discussion three hours a week).

*B. Cox*

### **Anthropology 54.475\* Contemporary Problems in Anthropology**

Contemporary ethnic studies.

*Prerequisite:* Introductory course in Sociology or Anthropology.

*Day Division:* 1969-70 (seminar two hours a week, first term).

*K. Molohon*

### **Anthropology 54.476\* Contemporary Problems in Anthropology**

Advanced Kinship Analysis.

*Prerequisite:* Final-year Honours standing or permission of the instructor.

*Day Division:* 1969-70 (seminar two hours a week, second term).

*C. S. Jones*

### **Sociology 53.485\* Contemporary Problems in Sociology: Exchange Theory**

This year only, the topic will be contemporary exchange theory in Sociology approached from a study of its basis in philosophy, economics, anthropology and psychology.

*Prerequisite:* Final-year Honours standing or permission of the instructor.

*Day Division:* 1969-70 (seminar three hours a week, second term).

*D. Forcese*

### **Sociology 53.486\* Contemporary Problems in Sociology**

Sociology of the Community.

A review of the various sociological perspectives used in research on the community. Case study and comparative approaches will be examined.

*Prerequisite:* Final-year Honours standing or permission of the instructor.

*Day Division:* 1969-70 (seminar two hours a week, second term).

*J. Harp*

**Sociology 53.490\* — Sociology 53.491\*** Tutorial in Sociology or Anthropology

A course designed to permit a student to pursue his interests in a selected area of Sociology or Anthropology. The student prepares papers as the basis for discussion with his tutor.

This can be taken for one or two terms, either on a single topic or two different topics.

*Prerequisite:* Final-year Honours standing or permission of the Chairman.

*Day and Evening Divisions:* Annually (tutorial hours arranged).

*Members of the Department*

**Sociology 53.497** Honours Seminar

**Anthropology 54.496** Honours Seminar

The seminar will provide a means for the students to integrate their experience in the discipline. The students will present a course prospectus to the Department early in the year, and the seminar will be conducted in consultation with members of the Department.

*Prerequisite:* Fourth-year Honours standing.

*Day Division:* 1969-70.

**Sociology 53.498** Honours Essay

**Anthropology 54.499** Honours Essay

At the end of the final year an Honours candidate is required to present a major essay based upon a supervised research project. The subject for research is arranged early in the year in consultation with the Department and an adviser is assigned. The student is orally examined upon his essay after its submission.

*Prerequisite:* Final-year Honours standing.

*Day Division:* Annually (tutorial hours arranged).

*Members of the Department*

**Graduate Seminars**

**Sociology 53.500\*** Seminar in Sociological Theory

*Prerequisite:* Sociology 53.300 or 53.305 or equivalent.

*Day Division:* 1969-70 (seminar two hours a week, first term).

*R. K. Crook and Z. A. Jordan*

**Sociology 53.501\*** Seminar in Sociological Theory

*Prerequisite:* Sociology 53.300 or 53.305 or equivalent.

*Day Division:* 1969-70 (seminar two hours a week, second term).

*R. K. Crook and Z. A. Jordan*

**Sociology 53.505\*** The Sociology of Knowledge

An examination of the relationship between ideas and their social context.

*Day Division:* 1969-70 (seminar two hours a week, second term).

*G. Neuwirth*



## **Sociology and Anthropology**

### **Sociology 53.510\*** The Methodology of Theory Construction

The nature of sociological constructs, and the logic of conceptual analysis will be examined.

*Prerequisite:* Sociology 53.300 or 53.305 or equivalent.

*Day Division:* 1969-70 (seminar two hours a week, second term).

*J. Harp*

### **Sociology 53.520** Comparative Social Systems

Comparative analysis of selected features of Canadian, British, and American social structure.

*Day Division:* 1969-70 (seminar two hours a week).

*J. Harp*

### **Sociology 53.521\*** Comparative Methods in Social Research

A seminar on the origins, contributions and current uses of comparative methods in sociology.

*Day Division:* 1969-70 (seminar two hours a week, second term).

*J. de Vries*

### **Sociology 53.525** Canadian Society

An analysis of Canadian social structure and institutions.

*Day Division:* 1969-70 (seminar two hours a week).

*J. A. Porter*

### **Sociology 53.530\*** Social Institutions I

*Selected Problems in the Sociology of Higher Education*

*Day Division:* 1969-70 (seminar two hours a week, first term).

*M. Frumhartz*

### **Sociology 53.531\*** Social Institutions II

*Educational Systems and Organizations*

*Day Division:* 1969-70 (seminar two hours a week, second term).

*M. Frumhartz*

### **Sociology 53.532\*** Seminar in Human Ecology

A discussion of the interrelationships between community, social organization, and environment, with particular emphasis on technology, population and culture.

*Day Division:* 1969-70 (seminar two hours a week, first term).

*K. Mozersky*

### **Sociology 53.540\*** Political Sociology

An examination of the sociological dimensions of power, politics and political behaviour.

*Day Division:* 1969-70 (seminar two hours a week, second term).

*M. Frumhartz*

### **Sociology 53.551\*** Theories of Child Development

Diverse major theoretical positions will be presented and evaluated in terms of research findings. The theories will be discussed from both a sociological and psychological perspective.

A student may not receive credit for both Sociology 53.551\* and Psychology 49.551\*.

*Day Division:* 1969-70 (seminar two hours a week, first term).

*R. M. Knights and S. Richer*

**Sociology 53.580\*** Power and Stratification

An examination of theories of elite behavior, social class, and ideology.

*Day Division:* 1969-70 (seminar two hours a week, second term).

*J. Hofley*

**Sociology 53.585\*** Selected Topics in Sociology

*Prerequisites:* Sociology 53.300 and permission of the instructor.

*Day Division:* 1969-70 (seminar two hours a week, first term).

*Z. A. Jordan*

**Sociology 53.586\*** Selected Topics in Sociology

*Day Division:* 1969-70 (seminar two hours a week, second term).

*Z. A. Jordan*

**Sociology 53.587\* (53.585\*)** Sociology of International Relations

Consideration of interdisciplinary work in the social sciences which has concerned itself with peace research and conflict resolution. Special attention will be paid to sociological models as they have been applied to the analysis of international relations.

*Day Division:* 1969-70 (seminar two hours a week, first term).

*D. Forcese*

**Sociology 53.592\* (53.586\*)** Sociology of Science and Technology

Study of the interaction between science, technology and change in modern societies.

*Day Division:* 1969-70 (seminar two hours a week, first term).

*B. A. McFarlane*

**Sociology 53.599** M.A. Thesis

*Members of the Department*

**Sociology 53.601\*** Theory (First Term)

**Sociology 53.602\*** Theory (Second Term)

An examination of the development and application of contemporary sociological theory.

*Day Division:* 1969-70.

**Sociology 53.610\*** Research Seminar (First Term)

**Sociology 53.611\*** Research Seminar (Second Term)

Study of selected techniques in data collection and analysis.

*Day Division:* 1969-70.

*Members of the Department*

**Sociology 53.699** Dissertation, Ph.D.

*Members of the Department*

The following courses, though not accepted for Sociology credits, are suggested for their immediate relevance to the discipline:

**Economics 43.220** Statistical Methods in the Social Sciences

**Geography 45.230** Cultural Geography

**Sociology and Anthropology**

**Geography 45.420** Urban Geography

**Geography 45.430** Geography of the Northlands

**Geography 45.435** Historical Geography

**Geography 45.530** Problems of African Development

**Mathematics 69.250** Introduction to Statistical Analysis

**Mathematics 69.257** Introduction to Statistics

**Philosophy 32.230** Logic and Philosophy of Science

**Political Science 47.270** Political Inquiry

**Political Science 47.310** The Politics of Developing Areas

**Political Science 47.360** Theories of International Relations

**Psychology 49.205** Statistics

**Psychology 49.405** Advanced Statistical Methods

**Psychology 49.540\*** Measurement

**Psychology 49.541\*** Mathematical Models

**Psychology 49.542\*** Correlational Techniques

# Spanish

Associate Professor;  
Chairman of the  
Department

C. A. Marsden

Associate Professors

F. Atienza, R. L. Jackson (on leave of absence, 1969-70),  
J. Jurado, F. de Toro-Garland

Assistant Professors

R. Larson, A. López-Fernández, J. M. López-Saiz,  
L. Lorenzo-Rivero, A. Lozano (St. Patrick's College),  
P. J. Roster, Jr. (St. Patrick's College)

Lecturer

Sessional Lecturers

A. Bégin, J. Claros, M. A. Giella, Susan Hendry,  
F. Hernandez, L. Latorre, R. G. Leclair,  
Basea Mosi6n, Madeleine Pelletier, M. Puerta,  
C. N. Wells, Marjorie Wesche, Janice Yalden

The Department offers both Pass and Honours courses to majors. Classes are generally conducted in Spanish, and laboratory instruction, compulsory at the 015 and 100 levels, is available to students in the more advanced language courses. Summer reading is set each year.

A list of prescribed texts and supplementary reading for all courses beyond the 100 level is available from the Secretary of the Department.

Courses listed below which begin with 06. are offered by St. Patrick's College and can be taken by students of the Rideau River campus.

## Major in Spanish

Interested students must consult with the Department as early as possible to plan their program. General requirements are as laid down on pp 21-22 of the Calendar. A major in Spanish normally consists of five courses after Spanish 38.100 (or 38.101 or 06.132), Spanish 38.210 being compulsory. A combined major will consist of four courses beyond the 100 level. Students who are beginning the study of Spanish at university, and who are considering Spanish as a major, should take note of Spanish 06.132 and 38.101 designed specifically for potential majors. They are also urged to accelerate their progress when possible by taking summer courses. The Department offers each summer Spanish 38.015, 38.100, 38.201\*, 38.202\*, 38.210, 38.301\*, 38.302\* and, when required, a reading course.

## Honours Course

General regulations concerning Honours courses are to be found on pp. 26-27. The Honours course in Spanish is designed to give the student a thorough knowledge of Hispanic language and literature. Lectures and seminars cover the origins and evolution of the language, the principal periods of Spanish and Spanish American literature, and include some study of allied literatures in view of further work at the graduate level. The program consists of nine courses after Spanish 38.015, of which Spanish 38.210 is compulsory. For an explanation of Honours standing see p. 13.

## Honours in Spanish and French

This course is designed specifically for the Interim Type A certificate of the Ontario College of Education. Seven courses are required in each language (including compulsory written and oral work in each year of the program). Spanish 38.210 must be taken, and a comprehensive examination (or a series of terminal essays) is to be completed by students during their final year. See also p. 174.

## Spanish

Students interested in pursuing an Honours program in which Spanish is combined with another subject are invited to discuss the matter with the Chairman of the Department of Spanish. The minimum requirements would be seven courses in Spanish.

### Graduate Courses

The M.A. program, begun in 1966, provides scope for study in depth of topics on Spanish and Spanish American language and literature. Courses in the 500 series currently being offered are found on pp. 325-326.

Regulations governing M.A. studies will be found on pp. 67-68. Students will note that a program in Spanish studies will admit, where appropriate, a credit in Romance Philology or Comparative Literature as well as certain Spanish courses at the 200-499 level.

All courses taken by graduate students will be chosen in consultation with the Department.

Students should note that, in addition to the Comprehensive Examinations in the M.A. year, they will have to satisfy the requirements of a (non-credit) Departmental Seminar on Bibliography and Research Methods, to be taken in either the Qualifying or the M.A. year.

#### Spanish 38.015 Introductory Spanish

An intensified course designed to give the student the fundamentals of written and spoken Spanish, together with a general introduction to Hispanic culture. Attendance at both classes and laboratory sessions is compulsory.

*Texts:* Da Silva, *Beginning Spanish* (Grammar and tape manual), 2nd edition.

Sábato, *El túnel* (summer reading for Spanish 38.100).

*Day and Evening Divisions:* Annually (lectures and laboratory four hours a week).

*Members of the Department*

#### Spanish 06.132 Intensive Introductory Spanish

A course designed for students with little or no knowledge of Spanish. Using an intensive audio-lingual approach to Spanish, students can attain in one year the level of proficiency and fluency normally gained in Spanish 38.015 (or 06.030) and 38.100 (or 06.130).

Students not making satisfactory progress will be transferred to the regular Introductory course (38.015 or 06.030).

*Prerequisite:* Permission of the Department.

*Texts:* to be announced.

*Day Division:* Annually, St. Patrick's College campus and/or Rideau River campus (lectures and laboratory six hours a week).

*P. Roster and Marjorie Wesche*

#### Spanish 38.100 Intermediate Spanish

A course intended to consolidate and supplement knowledge of the language and culture acquired in Spanish 38.015. Students who take Spanish 38.100 are expected to have fulfilled summer reading requirements.

*Prerequisite:* Spanish 38.015 or 06.030 or equivalent.

*Texts:* Da Silva and Lovett, *A Concept Approach to Spanish* (Grammar and tape manual). Others to be announced.

*Day and Evening Divisions:* Annually (lectures and laboratory four hours a week).

*Members of the Department*



**Spanish 38.101** Intensive Intermediate Spanish

A course for potential majors, to include more advanced language and reading than Spanish 38.100.

*Prerequisites:* Spanish 38.015 (or 06.030) or equivalent, and permission of the Department.

*Texts:* Da Silva and Lovett, *A Concept Approach to Spanish* (Grammar and tape manual). Others to be announced.

*Day Division:* 1969-70 (lectures and laboratory four hours a week).

*F. Atienza*

**Spanish 38.201\*** Spanish Conversation

Conversation and discussion of current problems, supplemented by occasional written work.

*Prerequisite:* Spanish 38.100 (or 38.101 or 06.132) or permission of the Department.

*Texts:* Carballo Picazo, *Español conversacional*; *Antología del Teatro, 1962-63*; and others.

*Day and Evening Divisions:* Annually (two hours a week throughout the year).

*Members of the Department*

**Spanish 38.202\*** Spanish Composition

A course designed to consolidate the linguistic knowledge attained in Spanish 38.100, and to inculcate the elements of a good Spanish style.

*Prerequisite:* Spanish 38.100 (or 38.101 or 06.132) or permission of the Department.

*Texts:* Levy, *Present-Day Spanish*, and others.

*Day and Evening Divisions:* Annually (two hours a week throughout the year).

*Members of the Department*

**Spanish 38.210** Hispanic Civilization

An introduction to the culture and civilization of Spain and Spanish America, including readings from their literatures. Required course for majors and honours.

*Prerequisite:* Spanish 38.100 (or 38.101 or 06.132) or permission of the Department.

*Principal Texts:* Ugarte, *Panorama de la civilización española*;

Arciniegas, *El continente de siete colores*.

*Day Division:* 1969-70 (three hours a week).

*F. de Toro-Garland*

**Spanish 06.230** Survey of Spanish Literature and Culture

The evolution of Spanish literature against its historical background, through the study of representative literary works of all types from the Middle Ages to the present.

*Prerequisite:* Spanish 38.100 (or 06.130 or 06.132) or permission of the Department.

*Texts:* Del Río, *Antología general de la literatura española*, Vols. I and II.

*Day Division:* 1969-70 (three hours a week). To be offered on the St. Patrick's College campus.

*A. Lozano*

**Spanish 38.301\*** Advanced Oral Spanish

An advanced sequel to Spanish 38.201\*.

*Prerequisite:* Spanish 38.201\* or permission of the Department.

*Day and Evening Divisions:* Annually (two hours a week throughout the year).

*Members of the Department*

## Spanish

### **Spanish 38.302\*** Advanced Spanish Composition

An advanced sequel to Spanish 38.202\*.

*Prerequisite:* Spanish 38.202\* or permission of the Department.

*Day and Evening Divisions:* Annually (two hours a week throughout the year).

*Members of the Department*

### **Spanish 38.320** The Golden Age

Spanish literature of the 16th and 17th centuries. Study of the principal works from *La Celestina* to Calderón.

*Prerequisite:* Spanish 38.210 or 06.230, or permission of the Department.

*Evening Division:* 1969-70 (three hours a week).

*J. M. López-Saiz and C. A. Marsden*

### **Spanish 38.330** Modern Spanish Literature

Spanish literature of the 19th and 20th centuries.

*Prerequisite:* Spanish 38.210 or 06.230, or permission of the Department.

*Day Division:* 1969-70 (three hours a week).

*F. Atienza*

### **Spanish 38.350** Spanish American Literature

The evolution of Spanish American literature through the study of representative literary works of all types from most Spanish American countries.

*Prerequisite:* Spanish 38.210 or permission of the Department.

*Day Division:* 1969-70 (three hours a week).

*L. Lorenzo-Rivero*

### **Spanish 38.402\*** Stylistics

An advanced course in the theory and practice of composition in Spanish, including also poetics.

*Prerequisite:* Spanish 38.302\* or permission of the Department.

*Day Division:* 1969-70 (two hours a week).

*A. López-Fernández*

### **Spanish 38.415** Introduction to Medieval Literature

A study of representative texts from the earliest times up to the end of the 15th century.

*Prerequisite:* Spanish 06.230 or 38.302\* or 38.320 or permission of the Department.

*Day Division:* 1969-70 (three hours a week).

*J. Jurado*

### **Spanish 38.420** Cervantes

A study of Cervantes and his age with particular reference to *Don Quijote*.

*Prerequisite:* Spanish 38.320 or permission of the Department.

*Not offered, 1969-70.*

### **Spanish 38.430** Modern Spanish Novel

Representative works of the 19th and 20th centuries.

*Prerequisite:* Spanish 38.330 or permission of the Department.

*Evening Division:* 1969-70 (three hours a week).

*A. López-Fernández*

**Spanish 38.450** 20th Century Spanish American Poetry

A study of the principal tendencies in 20th century Spanish American poetry.

*Prerequisite:* Spanish 38.350 or permission of the Department.

*Day Division:* 1969-70 (three hours a week). To be offered on the St. Patrick's College campus.

*P. Roster*

**Spanish 38.460** 20th Century Spanish American Novel

The characteristic works of the most noteworthy novelists of the first half of the 20th century.

*Not offered, 1969-70.*

**Spanish 38.490** Seminar on a Special Topic

Designed for Honours students normally in their final year, or for Graduate students. Research topics have in the past included: *García Lorca*, *Unamuno*, *Rubén Darío*, *Martí*, and *La Celestina*, and Poets of the Generation of 1927.

Topic for 1969-70: *The Essay in Spanish America*.

*Prerequisite:* Permission of the Department.

*L. Lorenzo-Rivero*

**Graduate Courses**

Half courses at the 500 level are listed as pairs, but may be taken singly unless otherwise indicated. The first half is from September to December; the second half from January to April.

**Spanish 38.505\*, 38.506\*** History of the Spanish Language

Annually.

*Principal Texts:* Menéndez Pidal, *Manual de gramática histórica española*; Lapesa, *Historia de la lengua española*; and others.

*J. Jurado*

**Spanish 38.515\*, 38.516\*** Aspects of Medieval Literature

*Not offered, 1969-70.*

**Spanish 38.520\*, 38.521\*** Special topic on Golden Age Literature

38.520\*, Topic for 1969-70: *The Picaresque Novel*

*C. A. Marsden*

38.521\*, Topic for 1969-70: *Didactic Literature of the Golden Age*.

*J. M. López-Saiz*

**Spanish 38.525\*, 38.526\*** Studies in 18th century Neo-Classicism

*Not offered, 1969-70.*

**Spanish 38.530\*, 38.531\*** Problems of Modern Spanish Literature

38.530\*, Topic for 1969-70: *Poets of the Generation of 1898: Machado and Unamuno*.

*F. Atienza*

38.531\*, Topic for 1969-70: *Juan Ramón Jiménez and The Modernista movement in Spain*.

*A. López-Fernández*

## Spanish

**Spanish 38.550\*, 38.551\*** Aspects of Spanish American Literature before 1888  
*Not offered, 1969-70.*

**Spanish 38.560\*, 38.561\*** Aspects of Spanish American Literature after 1888  
Topic for 1969-70: *The Spanish American Novel since 1947.*  
*R. Larson*

**Spanish 38.570\*, 38.571\*** Special problems in Spanish American Literature  
Topic for 1969-70: to be announced.

**Spanish 38.590** Directed Studies

**Spanish 38.598** M.A. Thesis (1 credit)

**Spanish 38.599** M.A. Thesis (two credits)

Graduate students should note also seminars on *The Picaresque Novel* and *The Oriental Folk Tale in Western Medieval Literature* which are offered by the Comparative Literature Committee in 1969-70.

## **Student Activities and Services**





# Student Activities

## *Student Participation in Academic Affairs*

Based on a plan proposed by the Students' Council which asked that Carleton become a true community of equals with students and faculty working hand in hand as co-equal partners, N.U.G. (New University Government) was adopted by the university. N.U.G. is a unique governing system wherein students at Carleton are formally involved in the government of the University at the level of departments, faculty boards and Senate.

Students in the second and subsequent years are eligible for nomination and election to these various bodies. The first level is election to the faculty and department boards through a general election of all the students in the various faculties and departments. From here election is possible to the Senate and the Board of Governors.

## *Student Government*

All registered students, day and evening, are members of the Students' Association. The Association is responsible for a large portion of student life on campus. As a self-governing body, it has a great deal of responsibility and independence in the handling of its affairs. Its functions include providing a channel of communication with the University authorities and with students throughout Canada and the rest of the world.

The legislative body for the Association is the Students' Council. Representatives from each faculty are elected to it in winter, to serve from March 15 to March 14 of the following academic year. Representatives of graduate students and residences are chosen in the fall, to serve from October 15 to October 14 of the following academic year.

The other members of the Students' Council are the executive arm of the Association, and these persons are elected in the winter to serve from March 15 until March 14 of the following academic year. Executive positions are: President, Vice-Presidents (Internal and External) Education Commissioner, Finance Commissioner, Activities Commissioner, Community Program Commissioner and Communications Commissioner.

The Association sponsors a wide variety of activities. Debates and symposiums concerning the financing and quality of education, publications, a closed-circuit radio station, clubs, musical and dramatic societies, social functions, and other recreational and cultural undertakings constitute the co-curricular student program. All of the co-curricular activities handled by the Association are aimed at involving students in more than purely academic pursuits, as well as maintaining a keen interest in the students' academic courses.

## *Student Conduct*

The Students' Association has been entrusted with a great deal of responsibility for the behaviour and discipline of all students at Carleton. Student conduct is governed by an Honour System and students are expected to know and adhere to the rules and regulations of the Association. Those who commit infractions are expected to report themselves; and, failing this, they may be reported by those witnessing the infraction. Administration of the Honour System is the responsibility of two bodies — an Honour Board (whose duties include education, investigation and prosecution) and a Judicial Committee.

### *Athletics and Recreation*

The athletics program at Carleton, which plays an important role in maintaining and enhancing the University spirit, is under the control of the Athletic Board. Athletic activities fall into the two basic categories of intramural and extramural.

Extramurally, Carleton is a member of the Ontario-Quebec Athletic Association and the Central Canada Intercollegiate Football Conference. Carleton varsity teams, called the Ravens, participate in basketball, football, hockey, soccer, skiing, badminton, tennis, golf, track and field, fencing, and curling.

The intramural program includes flag-football, cross-country, basketball, broomball, volleyball, badminton, swimming, curling and hockey. Some of these sports are co-educational although most are played separately by men and women.

Presently Carleton's athletic facilities include football and soccer fields, outdoor hockey and skating rink and a gymnasium building which houses the following facilities: 4 squash courts, weight lifting room, combatives room, gymnastics and multipurpose room and a gymnasium. These facilities are available for use by Carleton students for organized and recreational sports.

Those interested in participating or wanting further information on athletics and recreation are encouraged to contact Brian Kealey and Kim McCuaig for men's activities and Peggy Edwards for the women.

### *The University Centre*

A \$4.5 million University Centre is now under construction which by February of 1970 will house facilities for two cafeterias, a games room, offices for the Students' Association, newspaper and radio facilities, lounges, health services and other areas for general student use. The Centre will be run totally by the Students' Association.

Presently, the gymnasium building includes the following facilities: lounging and T.V. room, reading areas, tuck shop, squash courts, weight lifting facilities, combatives room and a multi-purpose gymnasium with a tartan floor. Offices for the Association are maintained in the tunnel beneath the Tory Science Building.

# Student Services

## Housing

1. Residences: Lanark House, Grenville House and Russell House provide space for 535 women students, Glengarry House and Renfrew House for 783 men students. (Renfrew House may serve as a co-educational residence.) This accommodation is for full-time unmarried students, graduate and undergraduate. The rooms are furnished; blankets and linens are supplied. Board and room for the academic year is \$890.00 for a single room, and \$840.00 for a place in a double room. For information and application forms, contact the Provost of Residences, 1231 Colonel By Drive, Ottawa 1 (telephone: 613-231-3611).
2. Off-Campus: The University Housing Registry will provide students, interested in living Off-Campus, with an Off-Campus Housing Booklet which contains a description of all accommodations that are available and suitable for University Students. Rates range from \$40 to \$120 per month depending on the type of accommodation, i.e. single room, room and breakfast, room and three meals, etc. Facilities are available for individual meals to be purchased on Campus. Experience has shown that living expenses for students are generally equivalent whether one lives off-campus or in residence. Copies of the booklets are available in the Off-Campus Housing Office but because the Registry does not suggest reserving accommodation without first visiting the premises, it is suggested students obtain up-to-date booklets on arrival in Ottawa.

## Approximate Cost of One Year (8 months) at the University

1. Tuition: Arts, Commerce, Journalism, Science, Engineering	\$556.50 \$616.50
2. Books, Instruments and Supplies (The maximum named is typical for 2nd year Engineering Students)	\$70-\$150.00
3. Board and Room in Residence	\$840-\$890.00
4. Board and Room off-campus — 2 meals in home, lunch in University Cafeteria	\$850-\$900.00
5. Clothes, Laundry, Entertainment, Transportation	\$300-\$450.00
Total	\$1,766-\$2,116.00

## Food

The University Commons contains a cafeteria for those desiring full meals (Breakfast — 75c, Lunch — \$1.00, Dinner — \$1.50) and a snack bar for short orders. In addition, many of the buildings are serviced by vending machines for light refreshment.

## Counselling and Health

The University Health Service is provided to protect and improve the physical and mental health of the students and of the university community. Its responsibilities are to ascertain the fitness of students to perform academic work and to participate in such activities as athletics, to consult and advise on matters of health, and to provide treatment within the limitations determined by facilities and availability of staff. When the necessary service cannot be provided by the program, the staff will endeavour through referral, to make available what is required. The nature of the service demands that the confidentiality of records and information be respected and maintained.

The University Health Clinic has regular hours and is staffed by a physician and nurse, counsellors and a consulting psychiatrist.

Students wishing assistance in planning their educational programs or in choosing a career should see: a) their Faculty Adviser; b) administrative officers, particularly the Deans, the Department Chairman, the Dean of Student Services or a member of the Counselling Service. The Overseas Students' Advisor (to be announced) invites overseas students to consult him on academic or personal matters. Students who have been elected to department, faculty boards and Senate are also available for counselling on academic matters.

### *Placement*

The Placement Office is a centre where students may seek help in obtaining employment (Full-time, Part-time and Summer).

Liaison is maintained with local employers as well as employers from all across Canada on opportunities for graduates, graduating students, students who withdraw from Carleton and students seeking summer employment.

Many of the companies conduct recruiting visits on-campus and these visits usually commence November 1 and continue through to the end of February. Information concerning companies and their requirements may be obtained and appointments with company representatives may be arranged through the Placement Office. Regular notices, including all Government opportunities, are published and posted on Employment Boards.

Students from first year up can avail themselves of occupational information.

### *Military Training*

1. The high professional ability required of present-day military officers demands the best in education and training. The Department of National Defence therefore sponsors programs of university education and leadership training for selected young men who have the potential to become officers in the Canadian Armed Forces. The admission standards are high, but for those who qualify the way is open to a challenging and rewarding career.

2. The programs sponsored are the Regular Officer Training Plan (ROTP) and the Reserve Officer University Training Plan (ROUTP). Training given under both plans is divided into two parts; Officer Cadets continue to attend their university throughout the academic year, and then go to a military unit or establishment for training each summer.

3. *ROTP*. This plan combines university subsidization with career training as an officer in the Regular Component of the Canadian Forces. Successful applicants are enrolled in the rank of Officer Cadet. They are required to maintain a good standing both academically and militarily while in the plan. All tuition and other essential fees are paid by the Department of National Defence. In addition the Officer Cadet receives an annual grant of \$125.00 to purchase books and instruments, and is paid \$193.00 per month for personal and living expenses. Free medical and dental care is provided. Annual Leave (30 days plus travelling time) with full pay and allowances may be granted each year, usually after the summer training period. On graduation the Officer Cadet is promoted to the commissioned rank of Lieutenant.

4. *ROUTP*. This plan provides an opportunity for selected undergraduates to prepare themselves for promotion to commissioned rank in the Reserve Component of the Canadian Forces. They are enrolled as Officer Cadets in the Primary Reserve, and receive pay for training completed at local units during the academic year (up to 15 days) and at training bases during the summer (up to 16 weeks).



5. *Admission Requirements.* An applicant must:
- a. be a Canadian citizen;
  - b. be single and remain so until commissioned (married applicants will be considered for ROUTP);
  - c. be physically fit for enrolment in the Forces; and
  - d. be between the ages of 16 and 21 of the first of January of the year he commences First Year studies at university.
6. *How to apply.* Interested students are requested to contact one of the following:
- |                                   |    |                                 |
|-----------------------------------|----|---------------------------------|
| Commanding Officer                |    | University Liaison Officer      |
| Canadian Forces Recruiting Centre |    | Canadian Forces Base Rockcliffe |
| 239 Queen Street                  | or | Ottawa 7, Ontario               |
| Ottawa 4, Ontario                 |    | Telephone 993-2308              |
| Telephone 233-4039                |    |                                 |



# Academic Awards and Financial Assistance

Medals are the major academic awards granted by the University to its superior graduating scholars. They have no monetary value.

Scholarships are awarded to students on entry to the University and to those in course on the basis of superior academic performance. Those with the highest scholastic standing are granted the scholarships having the highest monetary value. Scholarship students will receive the monetary value of their awards only if they are enrolled as full time students in the next academic year. Applications are not required for Entrance or In-Course Scholarships. An exception is the Mohr Scholarships for entering and undergraduate students. (see page 338).

All students registered at St. Patrick's College campus are eligible for many of the awards, both Entrance and continuing in the Faculty of Arts, that come under the jurisdiction of the Student Awards Office of the University.

Fellowships are awarded to students entering or in graduate studies at the University. Limited teaching duties are usually required of Fellows.

Prizes are awarded for excellence in particular areas of study. They may be cash awards or book prizes. No application is required.

Bursaries are awarded to students who can show genuine evidence of financial need and who have above average standing. Applications for bursaries should be made to the Awards Office not later than August 1. Students who are residents of the Province of Ontario or the Province of Quebec are required to apply for Provincial Bursaries (Student Awards) (see page 350).

Loans are awarded to students with satisfactory academic records who could not continue their studies without financial assistance. Applications for loans should be made to the Awards Office.

See index of awards on pages 361-364.

## Financial Aid for Students

1. *Source of Funds.* Funds for scholarships, prizes, bursaries, and loans are provided by the University and by gifts from individuals and associations. The University welcomes the offer of scholarships, prizes, medals, and bursaries. The Awards Office will be glad to send, on request, information as to the functions of scholarships and bursaries, and also a statement of particular needs at present in the financial aid program of the University. Scholarships, prizes, medals, bursaries, and loan funds may be accepted from donors at the discretion of Senate on appropriate recommendation of the President.

2. *Administration of Awards.* Awards of medals, scholarships, and prizes will be made by Senate to qualified candidates of merit; but the Senate may withhold any such award if no candidates of merit present themselves. The award of scholarships, prizes, and medals shall be final when formally announced by the University.

3. The standing of students being considered for any such awards shall be determined on the basis of courses taken for credit and shall not take account of extra courses being taken for no credit.

4. (a) No limitation shall be placed upon the number of prizes and medals which any one student may win in any one year. (b) A student may be declared the winner of as many scholarships as he may win as a qualified candidate of merit but, in the case of awards carrying a major financial amount, such student will normally receive the proceeds only of the largest among these major amounts. (c) Winners of scholarships and prizes may resign the monetary value but retain the honour of such awards,

and their names will be published as winners. In cases arising under 4(b) or 4(c), the monetary amounts so relinquished may be awarded by reversion if merited.

5. Scholars who hold continuing scholarships at Carleton University must maintain a level of academic performance each year satisfactory to the Committee on Admission and Studies, or relinquish their scholarships.

6. Students receiving scholarships and bursaries exceeding in total \$200 which are under the jurisdiction of the University will ordinarily be paid in two instalments, one in October and one in January. The University reserves the right to withhold the payment of the second instalment if the attendance or conduct of the student is not satisfactory. Awards of less than \$200 will ordinarily be paid in one instalment, in October.

7. The University does not guarantee the award of any scholarship, prize, medal, or bursary other than those created from funds of the University. Those awards based upon gifts of individuals or associations other than the University will be forwarded only after the funds required have actually been received from the donors.

## **Awards for Academic Excellence**

### **Medals**

#### *The Governor-General's Medal*

Awarded annually, to the student standing at the head of the graduating class.

Donor: His Excellency the Governor-General of Canada. Established 1952.

#### *University Medals*

Awarded annually, when merited, to the graduating students standing highest in Arts, Science, Commerce, Journalism, and Engineering. Established 1949.

#### *Senate Medals*

Awarded, when merited, to graduating students of outstanding academic achievement. Established 1952.

#### *Medal in Engineering (Ontario Association of Professional Engineers)*

Awarded annually, when merited, to the graduating student standing highest in Engineering. Established 1961.

### **Scholarships**

#### *1. Entrance Scholarships Tenable at Carleton University*

##### *Henry Marshall Tory Scholarships*

Eight Entrance Scholarships of \$500 each have been established by the University for open competition among students entering Carleton University at either senior or junior matriculation level. Each scholarship will be tenable for one year.

Established 1961, and named to commemorate the first president of Carleton University, Dr. Henry Marshall Tory.

##### *Francis C. C. Lynch Entrance Scholarships*

Fifteen Entrance Scholarships of \$400 each have been established for open competition among students entering the first year of Arts, Science, Commerce, Journalism or Engineering. Preference will be given where possible to an applicant from each of the Ottawa secondary schools. Each scholarship will be tenable for one year.

Donor: The late Francis C. C. Lynch. Endowed 1967.

### *Mercy Neal Southam Entrance Scholarships*

Four \$500 scholarships will be awarded annually, if merited, to students entering the First year of Arts, Journalism, Commerce, Science, or Engineering at Carleton University.

The conditions of award and administration of the Mercy Neal Southam Entrance scholarships will be the same as those governing the University Entrance scholarships (described immediately below) except that each scholarship will be payable in two successive annual instalments of \$250, subject to scholarly performance.

Established in 1949 under the terms of bequest of the late Wilson Mills Southam, the scholarships are in memory of his grandmother, Mercy Neal Southam.

### *Ontario Scholarship Program*

The Province of Ontario awards an Ontario Scholarship to all students who achieve an average of 80% or better in papers worth seven high school credits, as required for the Ontario Secondary Honour Graduation Diploma, and written in June of the year of completion of Grade 13. These students will be designated "Ontario Scholars" and will receive an award of \$150 or less depending on the amount of other awards.

### *University Entrance Scholarships*

Ten scholarships valued at \$400 each for one year have been provided by the University for general competition among the students entering Carleton University at the senior or junior matriculation level.

### *General Entrance Scholarships*

Twenty scholarships valued at \$300 each for one year have been provided by the University for general competition among students entering Carleton University at the senior and junior matriculation level. Established 1963.

### *Friends of Carleton Scholarships*

Fifteen scholarships valued at \$300 each have been provided for general competition among students entering Carleton University at the senior and junior matriculation level. Each scholarship will be tenable for one year.

Donor: The Friends of Carleton University. Established 1967.

### *Ottawa Citizen Scholarship*

A scholarship valued at \$1200 will be awarded annually, if merited, to a student entering Carleton University from a high school in any one of the following counties in the Ottawa district: nine in Ontario—Carleton, Dundas, Glengarry, Grenville, Lanark, Prescott, Renfrew, Russell and Stormont—and four in Quebec—Gatineau, Hull, Papineau and Pontiac.

Candidates with junior or senior matriculation may apply for admission to Qualifying University or First year of Arts, Commerce, Journalism, or Science.

Candidates with senior matriculation may apply for admission to Engineering.

A student admitted with junior matriculation standing will receive \$300 per year for a period of four years; a student admitted with senior matriculation standing will receive \$400 per year for a period of three years; always provided that, in both cases, the student is registered as a regular full-time student of Carleton University and maintains a satisfactory academic standing.

A candidate for this scholarship must present evidence of high scholastic attainment, together with a record of outstanding participation in the extra-curricular activities of his school.

Donor: The Ottawa Citizen. Established 1955.



#### *Ottawa Citizen Scholarship in Journalism*

Maximum value \$1,200. Awarded annually to a student entering First year of Journalism. The winner will receive \$300 a year until graduation provided the student is registered as a full-time student at Carleton University and maintains a satisfactory academic standing in the Journalism program.

Donor: The Ottawa Citizen. Established 1969.

#### *Duchess of Connaught Scholarship*

The yield from the endowment of this historic scholarship, amounting to approximately \$350 annually, has been made available to Carleton University by the Laurentian Chapter, I.O.D.E. The scholarship is to be awarded to an able student entering Carleton University, and may be held until graduation, if merited; at which time a new award will be made.

Donor: Laurentian Chapter, I.O.D.E. Established at Carleton University, 1960.

#### *Dobbie Regional Entrance Scholarships*

Eight Entrance Scholarships valued at \$400 each will be available for 1969-70 for students entering Carleton University with junior or senior matriculation standing on the following distribution:

(a) Four scholarships available for Ontario (except the City of Ottawa) and the Western Provinces and Territories.

(b) Four scholarships available for Quebec Province and the Maritime Provinces. Each scholarship will be tenable for one year.

Donor: The late Jemema Grace Dobbie. Endowed 1967.

#### *International Nickel Company Scholarship*

One entrance scholarship has been established by The International Nickel Company of Canada, Limited, restricted to study in the fields of engineering, geology, geophysics, mathematics, chemistry, and physics. The scholarship covers tuition fees, a grant of \$300.00 to the student, as well as a cost-of-education supplement of \$500.00 to the University. The maximum award for a scholarship is \$1,200.00. Any graduate of a high school or the equivalent, or any student in his final high school year, who has good scholastic standing and personal reputation, is eligible. It is awarded by the University Scholarships Committee on the basis of the applicant's record, character, and financial need. The scholarship is renewable annually to the student for a maximum of three additional academic years or, in certain cases, until graduation, whichever is the shorter period. Further details from the Awards Office.

Donor: The International Nickel Company of Canada, Limited. Established 1956.

#### *D. Roy Campbell Entrance Scholarship*

Value \$500. Awarded annually for a period of ten years, under the terms of the will of the late D. Roy Campbell, for competition among students entering Carleton University with high standing in the senior matriculation examinations or the equivalent.

Donor: The late D. Roy Campbell. Established 1962.

#### *Dr. Frederick William Charles Mohr Scholarships*

Twenty-six scholarships of a maximum value of \$500 each have been made available for annual competition among students entering Carleton University or proceeding from one year of course to another at the University, and who come from communities within the following Ontario and Quebec counties:

Ontario: Renfrew, Russell, Prescott, Glengarry, Stormont, Dundas, Grenville, Carleton, Lanark, Nipissing, Leeds.

Quebec: Pontiac, Gatineau, Hull, Papineau, Argenteuil, Temiskaming.

These awards are provided through the bequest of the late Dr. F. W. C. Mohr.

The scholarships will be awarded by the University on the basis of high academic performance and of financial need. It is necessary to make specific application for these scholarships, and forms for this purpose may be obtained from the Awards Office.

Donor: The Frederick W. C. Mohr Estate. Endowed 1963.

*Association of Professional Engineers' Entrance Scholarship*

Value \$500. Awarded annually to a Grade 13 student of high proficiency who is entering the engineering course.

Donor: The Ontario Professional Engineers' Foundation for Education. Established 1961.

*James H. Rattray Memorial Scholarships*

Two scholarships valued at approximately \$200 each. Awarded annually to a student entering the first year Engineering at Carleton University.

Donor: The late James H. Rattray, M.C. Endowed 1961.

*Naomi Cook Scholarship Fund*

Value \$250 approximately. Awarded annually to students with high academic standing entering Carleton University.

Donor: The late Naomi Cook. Endowed 1967.

*W. H. Cramm Scholarship*

Value \$200 approximately. Awarded annually to a male student of high proficiency entering Carleton University from Nepean High School, Ottawa.

Donor: The late Jennie Shibley Cramm. Endowed 1967.

*Jennie Shibley Cramm Scholarship*

Value \$200 approximately. Awarded annually to a female student of high proficiency entering Carleton University from Nepean High School, Ottawa.

Donor: The late Jennie Shibley Cramm. Endowed 1967.

*William Teron Scholarship in Architecture*

Value \$300.00 each. Four scholarships awarded annually, one each to an outstanding student in architecture proceeding from the First to the Second year, Second to Third year, Third to Fourth year, Fourth to Fifth year, in the architecture curriculum.

Donor: William Teron. Established 1969.

*Army, Navy & Air Force Veterans in Canada (Ottawa Unit) Centennial Scholarship*

Value \$500. Awarded annually for general competition among students entering Carleton University at the senior or junior matriculation level from the Secondary Schools of Metropolitan Ottawa. Preference will be given, where possible, to the children of veterans.

Donor: The Army, Navy and Air Force Veterans in Canada, Ottawa Unit 352. Established 1968.

*Blok-Lok Limited Scholarship*

Value \$250. Awarded annually to a worthy student entering or enrolled in the School of Architecture.

Donor: Blok-Lok Limited, Weston, Ontario. Established 1968.

## *II. Scholarships for Undergraduate Competition*

### *J. P. Bickell Foundation Scholarships*

The Trustees of the J. P. Bickell Foundation have established in the Department of Geology, Faculty of Science, scholarships for students entering the Geological profession, of a possible value of \$1,500 each. The Scholarships may be awarded on entrance into the Honours Geological sequence at the First, Second or Third year levels at Carleton University. The scholarships are payable over two or three years depending on the entrance level. Three scholarships will be available for 1969-70.

Application must be made to the Chairman of the Department of Geology by May 15. In order to be eligible, the applicant must undertake to register in the Honours Geology sequence with a minor in Biology, Chemistry, Mathematics, or Physics; or a combined Honours sequence of Geology and one of the above-mentioned subjects.

Full particulars and application forms may be obtained from the Awards Office.

### *Alcan Scholarship*

A scholarship has been established by the Aluminum Company of Canada, Limited, restricted to students proceeding to a degree in Honours Chemistry, Mathematics or Physics, in Engineering Physics, or Mechanical Engineering.

The award will normally be in the amount of \$500 to the student, with an additional grant of \$300 to the university; it is made by the University Scholarship Committee on the basis of the applicant's record, character and financial need. The holder of the scholarship may reapply for it in the following year and will be considered on an equal basis with other students.

Donor: The Aluminum Company of Canada, Limited. Established 1964.

### *Maxwell MacOdrum Scholarships*

Six scholarships totalling \$3,000 have been provided by the University for annual competition for undergraduates entering the fourth year of course. Each scholarship will be awarded on a basis of outstanding performance and will be tenable for one year.

The scholarships are named in memory of Dr. Maxwell MacOdrum, second president of Carleton University. Established 1961.

### *Carleton Alumni Association Scholarships*

Scholarships totalling \$1,000 have been provided for undergraduates passing from one year of course to another at Carleton University with high standing. Certain of the scholarships are reserved for students in honours.

Donor: The Alumni Association of Carleton University.

### *James A. Gibson Scholarships*

Scholarships totalling \$1,000 have been provided for superior students passing into the final year of the undergraduate course at Carleton University. The scholarships are named in honour of Dr. James A. Gibson, former Dean of the Faculty of Arts and Deputy to the President of Carleton University.

Donor: The Alumni Association of Carleton University.

### *Irene Gertrude Stitt Scholarship Fund*

Four scholarships totalling \$1,600. Awarded annually to students of high proficiency proceeding from one year of course to another at Carleton University. The fund has been made possible by a bequest of the late Edith May Stitt, in memory of her sister, Irene G. Stitt. Endowed 1966.

*Arthur A. Crawley and Company Scholarship*

Value \$500. Awarded annually, if merited, to the student obtaining the highest average marks in second year Commerce, or in second year Arts (Economics), who proposes to pursue upon graduation the course given by the Institute of Chartered Accountants of Ontario. The scholarship is of value of \$500, payable \$250 at time of registration for the third year course at Carleton University, and \$250 on January 2 following, provided the student is in good standing at Carleton University. Donor: Arthur A. Crawley and Company, Ottawa. Established 1964.

*Association of Professional Engineers' Scholarships*

Value \$250 each. Three scholarships are awarded annually to engineering students of high proficiency proceeding from one year of course to another in Carleton University.

Donor: The Ontario Professional Engineers' Foundation for Education. Established 1961.

*Touche, Ross, Bailey and Smart Scholarship*

Value \$250. Awarded to a student who is entering the final year of the degree course in Commerce, and who intends upon graduation to study for the qualification of Chartered Accountant. The award will be made to the student whose character, ability, academic records, and other qualities are, in the opinion of the Committee on Commerce Studies, those needed by a Chartered Accountant. Applications should be submitted to the Chairman of the Commerce Studies before March 1.

Donor: Touche, Ross, Bailey and Smart. Established 1962.

*Ottawa Ladies' College Scholarships*

Ten scholarships totalling \$4,000 have been provided by the University for annual competition among undergraduates for the various disciplines. Each scholarship will be awarded on the basis of outstanding performance and will be tenable for one year. Endowed 1967.

*General In-Course Scholarships*

Sixteen scholarships totalling \$4800 have been provided by the University for superior students proceeding from one year of course to another at Carleton University. Each scholarship will be awarded on the basis of outstanding performance and will be tenable for one year.

*Francis C. C. Lynch In-Course Scholarships*

Fifteen scholarships totalling \$6,000 have been provided for undergraduates passing from one year of course to another at Carleton University with high standing. Donor: The late Francis C. C. Lynch. Endowed 1967.

*Roderick C. McDonald Memorial Scholarship in Engineering*

Value \$300. Awarded annually to an engineering student of high proficiency entering the fourth year of course. The scholarship is named in memory of the late Roderick C. McDonald, who before his death in 1961, was a member of the Faculty of Engineering.

*Jacob Freedman Scholarships*

Two scholarships totalling \$800. Awarded annually to outstanding students who are proceeding from one year of course to another at Carleton University.

Donor: The late Jacob Freedman. Endowed 1967.



*Hume Wrong Scholarship*

Value approximately \$225, being the yield of a fund of \$5,000, established by Mrs. Hume Wrong in memory of her late husband. Awarded annually to the leading student in third year History or Political Science, proceeding to his or her final honours year.

Donor: Mrs. Hume Wrong. Established 1962.

*Gavin Scott Macfarlane Memorial Scholarship*

Value \$200. Awarded annually to an outstanding student, preferably in Honours, who is proceeding from one year of course to another in Carleton University.

First donated 1957, by Mrs. G. S. Macfarlane in memory of her husband, Lieutenant-Colonel Gavin Scott Macfarlane.

*Lord Dundonald Chapter (I.O.D.E.) Scholarship*

Value \$100. Awarded annually to a student of superior standing and general proficiency, entering the final year of a degree course at Carleton University.

Donor: Lord Dundonald Chapter, I.O.D.E. Established 1956.

*Ottawa Women's Canadian Club War Memorial Scholarship*

Value approximately \$100. Awarded annually to a student progressing from Qualifying University year to First year in Carleton University. Preference is given to veterans or their children. Endowed 1946.

*Clendinnen Scholarship in Biology*

Value \$100. Awarded annually to an outstanding student proceeding from the third to the fourth year of the honours course in Biology at Carleton University.

Established 1951, in memory of Mr. and Mrs. T. E. Clendinnen, by their daughter.

*University Women's Club of Ottawa Scholarships*

Two scholarships valued at \$250 each. Awarded annually to a woman student at Carleton University enrolled in a degree program as a part-time student and who has completed at least two full courses with second class standing or better. These awards are to be administered by the Scholarship Committee of the University Women's Club of Ottawa in co-operation with Carleton University.

Donor: University Women's Club of Ottawa. First established in 1952 in honour of Dr. Alice E. Wilson.

*Charles Anthony Blundell Betts Memorial Scholarship in Physics*

Value approximately \$450. Awarded annually, if merited, to a student of high proficiency in Physics, entering or continuing in Physics Honours or in the Major course, in the second or subsequent years of the degree course.

Donors: Mr. and Mrs. Oliver Betts, Birmingham, England, in memory of their son, Charles Anthony Blundell Betts. Established 1964.

*C. V. Hotson Memorial Scholarship*

Value \$100. Awarded annually to an undergraduate student who maintains high academic standing and is active in student affairs. Donated by Carleton Alumni and other friends in memory of Mr. Hotson, a 1950 Carleton Journalism graduate and former member of the Students' Council who returned to Carleton in 1953 to become Administrative Assistant to the President and Executive Secretary of the Alumni Association, positions he held until his death in October, 1960.



*Regent Vending Machines Limited Scholarships*

Two scholarships valued at \$100 each. One scholarship is awarded annually to an outstanding student in Engineering proceeding from the First to Second year in the Engineering curriculum; and the second scholarship to such a student proceeding from the Second to the Third year of the curriculum.

Donor: Regent Vending Machines, Limited. Established 1954.

*Riddell, Stead, Graham and Hutchison Award*

Value \$500. This award is given to a student who is completing his pre-graduation year and is proceeding on to his graduating year. This award is to be applied to the payment of student's tuition fees for his final undergraduate year at Carleton. The award will be made to the student whose personality, ability, academic record and other characteristics are, in the opinion of the Committee on Commerce Studies, those needed by a Chartered Accountant.

Donor: Riddell, Stead, Graham and Hutchison. Established 1960.

*National Press Club of Canada Scholarship in Journalism*

A sum equal to tuition fees to be awarded annually to a student enrolled in the final year in Journalism at Carleton University.

Donor: The National Press Club of Canada. Established 1965.

*Dr. Harry Katznelson Memorial Scholarship*

Value approximately \$100. Awarded annually to an outstanding student proceeding into an advanced year in the Honours Biology program.

Application must be made to the Chairman of the Department of Biology by May 15.

Donor: The Friends of the late Dr. Harry Katznelson, B.S.A., M.Sc., Ph.D., F.R.S.C., Director of the Microbiology Research Institute, Federal Department of Agriculture. Established 1965.

*Women's Residence Association Scholarship*

Value \$150 to be applied to residence fees. Awarded annually to a female undergraduate returning to Residence and having attended Carleton University for a full winter session. Nominations must be received by the Provost of Residence by May 1.

Donor: The Women's Residence Association. Established 1966.

*L. N. Wadlin Scholarship in Mathematics*

Value approximately \$225. Awarded annually to a student proceeding from one year to another at Carleton University who has shown excellence in the study of mathematics.

Donor: The late Lorenzo N. Wadlin. Endowed 1965.

*Carleton University Faculty Scholarship Fund*

Provided annually by the Faculty to assist students of good academic standing who have completed one academic year in the university. Established 1958 as Bursary Fund. Established 1967 as a Scholarship Fund.

*J. Lansing Rudd Scholarship*

Value \$300 approximately. Awarded annually to a superior student progressing from Qualifying year to First year in Carleton University.

Donor: The late J. Lansing Rudd. Endowed 1967.

*Lithwick, Lambert, Sim and Johnston Scholarship*

Value \$300. Awarded annually to an outstanding student who has completed the Third year of course in the School of Architecture at Carleton University. (This Scholarship will be first awarded in the spring of 1971).

Donors: Lithwick, Lambert, Sim and Johnston, Architects. Established 1968.

*William "Bill" Dumsday Memorial Scholarship*

Value \$250. Awarded annually to a student with high standing entering the final year of his or her degree program in the School of Journalism or the Faculty of Arts at Carleton University.

Donor: Canadian Public Relations Society, Ottawa. Established 1967.

*Donald William Buchanan Scholarship*

Value \$250 approximately. Awarded annually for general competition among students entering Carleton University at the senior or junior matriculation level.

Donor: The late Donald William Buchanan. Endowed 1967.

*Page and Steele School of Architecture Scholarship*

Value \$300. Awarded annually to an outstanding student enrolled in the School of Architecture at Carleton University.

Donor: Page and Steele Architects. Established 1967.

*Watson J. Balharrie Scholarship*

Value \$200. Awarded annually to a student who has studied for two successive years in the School of Architecture of Carleton University with distinction. (Available until 1970 to *all* architectural students who enroll).

Donor: Anonymous. Established 1967, on the death of Professor Watson J. Balharrie, a distinguished Ottawa architect, who taught for twenty years at McGill University.

*James E. Whenham Scholarship*

Value \$200. Awarded annually to a student of superior standing enrolled in the School of Architecture, Carleton University.

Donor: James E. Whenham. Established 1968.

*Institute of Chartered Accountants of Ontario Scholarship*

Value \$300. Awarded annually to a student entering the final year of an honours program in the Faculty of Arts with first class honours standing.

Donor: The Institute of Chartered Accountants of Ontario. Established 1965.

### *III. Post-Graduate Awards Tenable at Carleton University*

#### *General*

Carleton University offers annually a number of fellowships of value ranging from \$1,600-\$3,500. The Fellowships carry with them teaching duties; they do not include remission of fees. Bursary and loan funds are also available for graduate students (see pp. 350 and 356).

Applications for the Fellowships must be received by March 1.

#### *Commonwealth Scholarships*

Under a plan drawn up at a conference held in Oxford in 1959, each participating country of the Commonwealth offers a number of scholarships to students of other Commonwealth countries. These scholarships are mainly for graduate study and are tenable in the country making the offer. Awards are normally for two years and cover travelling, tuition fees, other university fees, and a living allowance.

For details of the awards offered by the various countries consult the Awards Office of Carleton University or write to the Association of Universities and Colleges of Canada, 151 Slater Street, Ottawa. Persons doing so are advised to inquire not later than October 11 in 1969, if planning to apply for the year 1969-70.

### *Northern Electric Graduate Research Fellowship*

Value \$1500. Established by the Northern Electric Company to assist graduate students proceeding towards a Master's or Doctor's degree in Electrical Engineering, Engineering Physics, Physics, Physical Chemistry, Metallurgy or Applied Mathematics, and preferably whose thesis work can be expected to have implications for the Communications industry. The candidate must be a Canadian citizen or landed immigrant in Canada, and a graduate of a recognized university. The candidate must provide the Northern Electric Company with a copy of his thesis when it is completed.

Applications must be received by the Graduate Studies Office by April 1.

### *Reader's Digest Fellowship in Journalism*

One fellowship of \$535 is available to graduates in Arts who have good standing in their academic subjects. Experience in practical journalism in any medium should be reported and will be taken into account. All the material relevant to the application, including information on past experience in newspaper, magazine, radio, TV or other fields of journalism or writing, together with letters of reference from newspaper editors, must be submitted to the Department of Journalism, Carleton University, by August 15 of the year in which the fellowship is awarded.

Donor: Reader's Digest Association (Canada) Limited. Established 1961.

### *Maclean-Hunter Award in Journalism*

Value \$1,000. Awarded annually to a student entering the one year program in Journalism for university graduates mainly on the basis of previous academic performance.

Donor: Maclean-Hunter Publishing Company Limited. Established 1967.

### *Other Post-Graduate Awards tenable at Carleton*

The awards available in greatest numbers to Canadian students are those offered by the National Research Council, the Canada Council, and the Government of Ontario. Further information is available through the Graduate Studies Office and the Awards Office at Carleton University.

The principal awards for overseas students are the Commonwealth Scholarships and those offered by the Canadian Government. Students should apply through the appropriate Government Education Offices in their own countries.

A full listing is given in the book "Awards for Graduate Study and Research", published by the Association of Universities and Colleges of Canada, 151 Slater Street, Ottawa.

### *Dafoe Foundation Post-Graduate Fellowship*

To assist graduate studies conducive to an understanding of international relations, the Dafoe Foundation will provide a post-graduate fellowship each year until further notice. The fellowship will be tenable annually at Carleton University, beginning with the academic session 1970-71. The fellowship will have the value of \$3,000.00.

Graduate studies may be undertaken in such fields as international relations, political science, international or other economics, or diplomatic or other history. The governing consideration is that such studies should have relevance to the purpose for which the fellowship has been established.

A candidate must file his application with the Dean of Graduate Studies Office at Carleton University. Conditions of application will be determined independently by the participating university.

#### *IV. Post-Graduate Scholarships Tenable Elsewhere*

Students are invited to watch the University bulletin board for notices of scholarships, and to consult the Awards Office which has a number of publications outlining fellowships and scholarships available for study in the various universities in Canada and abroad.

##### *Province of Ontario Graduate Fellowships*

Fellowships, up to the value of \$1,500 for one academic year (8 months) or an amount not to exceed \$2,250 for an academic year and the period between academic years (12 months) are offered by the Province of Ontario. The minimum prerequisite is an Ontario Honours B.A. or its equivalent. A Fellow pledges to give serious thought to a career in university teaching and during tenure he will undertake a full-time program of graduate study. Fellowships are tenable only at Ontario universities and most awards will be made to candidates who are residents of Ontario. Application is to be made on the prescribed form which may be obtained from the Dean of Graduate Studies and the Awards Office. Deadline date is February 15.

#### **Prizes**

##### *Clarkson, Gordon & Co. Prize*

Value \$100. Awarded annually to the student with the highest standing in the First year of the Commerce course.

Donor: Clarkson, Gordon & Co. Established 1962.

##### *B'nai B'rith Awards*

Two of \$50 each. Awarded annually to students with superior academic records, progressing from one course-year to another in Carleton University.

Donor: B'nai B'rith, Ottawa Lodge No. 885. Established 1947.

##### *Faculty Club Prize*

Value \$50. Awarded by the Faculty Club of Carleton University to a student chosen by the President. Established 1946.

##### *National Council of Jewish Women Award in History*

Value \$100. Awarded on the recommendation of the Department of History to the student achieving the best standing in Canadian History.

Donor: National Council of Jewish Women, Ottawa Section. Established 1950.

##### *National Council of Jewish Women Award in Psychology*

Value \$100. Awarded on the recommendation of the Department of Psychology to the student achieving the best standing in Psychology.

Donor: National Council of Jewish Women, Ottawa Section. Established 1963.

##### *Lilian I. Found Prize for Poetry*

Value \$25. Offered annually for the best lyric of fifty lines or less submitted by an undergraduate of Carleton University by March 15. Details may be obtained from the Department of English.

Donor: Mrs. Lilian I. Found. Endowed 1950.

##### *Chemical Institute of Canada Prize*

Value \$25. Awarded as a book prize to the best student proceeding to the final year of the course leading to the degree of Bachelor of Science with honours in Chemistry.

Donor: The Chemical Institute of Canada. Established 1950.



#### *Engineering Institute of Canada Prizes*

For proficiency in engineering studies and an interest in professional affairs, a prize of \$200 and an engraved certificate are awarded to a deserving student completing third year Engineering, and a prize of \$100 and a certificate are awarded to a deserving student completing second year Engineering.

Donor: The Engineering Institute of Canada. Established 1965.

#### *D. F. McKechnie Prize in Accounting*

The yield of a \$200 fund is used each year to purchase a book prize to be awarded, when merited, to a student in Commerce for proficiency in the study of accounting.

Donor: D. F. McKechnie, C.A. Endowed 1951.

#### *Society of Chemical Industry Award*

A gold key with the crest of the Society of Chemical Industry in front and the name of the winner, course, year and university on back is granted to the student who has the highest standing in the final year of the honours course in Chemistry. Winner will also receive a year's subscription to the Journal, *Chemistry and Industry*.

Donor: Canadian Section, Society of Chemical Industry. Established 1961.

#### *American Society for Metals Prize in Engineering*

Value \$25. Awarded annually to a student with high standing in the first year of the Engineering course.

Donor: Ottawa Valley Chapter, American Society for Metals. Established 1951.

#### *Henry Birks and Sons (Ontario) Ltd. Award*

Value \$25. Awarded annually to a Carleton University student with a superior academic record who has contributed substantially to extracurricular activities.

Donor: Henry Birks and Sons (Ontario) Ltd. Established 1951.

#### *Wilgar Memorial Prize in English*

The yield of a \$200 fund is used each year for a book prize to be awarded to a Carleton University undergraduate who has shown excellence in essay-writing. Established 1951, in memory of the late W. P. Wilgar, Assistant Professor of English at Carleton University, 1948-50. Endowed 1952.

#### *Henry Marshall Tory Award*

Presented annually to an outstanding graduating student who has shown a high degree of academic application, has indicated an interest in the University by broad participation in extracurricular activities of a constructive nature, has indicated qualities of leadership, and has attended Carleton University for at least three winter sessions.

Each candidate is nominated by at least five members of the Students' Association and selection is made by a committee composed of the President of the University, the Dean of Students, the Awards Officer, a member of the Faculty Board, and three students chosen by the Students' Council.

The winner's name is inscribed on the master trophy and he receives a miniature replica.

The award was established in 1950 by the Students' Council of Carleton University.

#### *Saga Residence Award*

Value \$440. Awarded annually to a student in residence with good academic standing who has demonstrated interest and leadership in residence student activities. The recipient is to be selected by the Provost of Residence.

Donor: Saga Food Service of Canada Limited. Established 1969.



*Mrs. George S. Abbott Memorial Prize in Law*

For proficiency in law courses taken at Carleton University, a prize of subscriptions to *THE CANADIAN BAR REVIEW* and *PUBLIC LAW* is awarded to a student planning to enter law school.

Donor: Anonymous. Established 1968 in memory of Mrs. George S. Abbott.

*H. Carl Goldenberg Book Prize*

Value \$25. Awarded annually as a book prize for excellence in Journalism subjects taken in the Second year of the Bachelor of Journalism course.

Donor: H. Carl Goldenberg, O.B.E., Q.C., of Montreal. Established 1953.

*Kenneth R. Wilson Memorial Award for Journalism Graduates*

Value about \$300. Offered annually to a student graduating in Journalism who, in the opinion of a board of selection, shows exceptional promise as a future reporter and interpreter of Canadian affairs. Endowed 1953, in memory of Kenneth R. Wilson, Ottawa Editor of *The Financial Post*, by a group of his personal friends.

*Catherine Daumery Memorial Prize for Botanical Collection*

Value \$35, together with a book prize. Awarded annually, if merited, on the recommendation of the Department of Biology, to a student who has submitted, by November 1, an outstanding collection of mounted and identified flowering plants.

Donor: Anonymous. Established 1953.

*Elizabeth White Memorial Prize for Zoological Collection*

Value \$35, together with a book prize. Awarded annually, if merited, on the recommendation of the Department of Biology, to a student who has submitted, by November 1, an outstanding collection of insects or arachnids, properly preserved and identified.

Donor: Anonymous. Established 1953.

*Alan Larocque Prize in Mathematics*

Value \$15. Awarded annually as a book prize to the highest ranking graduate in Honours Mathematics.

Donor: Alan Larocque, B.Sc., an honours graduate in Mathematics of Carleton University. Established 1956.

*Dr. M. Ralph Berke Prize in Chemistry*

The yield of a \$500 fund is awarded each year, if merited, on the recommendation of the Department of Chemistry for a prize to be awarded to an outstanding student majoring in Chemistry proceeding from the Second to the Third year of the degree course.

Donor: Dr. M. Ralph Berke. Established 1956.

*American Society H.R.A.E. Prizes*

Value \$100, to be awarded 1969-70 as follows: one first prize of \$75 for the best Summer Essay; one second prize of \$25 for the Summer Essay.

Donor: American Society of Heating, Refrigerating, and Air Conditioning Engineers, Ottawa Valley Chapter. Established 1958.

*Ann Smith Freedman Memorial Prize*

Value \$50. Awarded to the student in Psychology who has gained the highest standing in the experimental paper in Psychology 49.200 during the academic year.

Donors: Mr. and Mrs. Jarvis Freedman. Established 1958.

*Prize of the Canadian Institute of Mining and Metallurgy (Ottawa Branch)*

Value \$150. To be awarded to a worthy student completing his Second year at Carleton University and registered in one of the branches of the mineral industry; the student to have attained at least high second class honours; the selection to be made by the Dean of the Faculty of Engineering and the Chairman of the Department of Geology, jointly. If there is no suitable candidate registered in one of the mineral science courses, the Award is to be made to a qualified student in one of the other branches of engineering. Established 1956.

*International Nickel Co. of Canada Ltd. Award in Journalism*

For the graduating student in Journalism with the best record in the Journalism subjects, a plaque and the prize of a portable typewriter is provided by the International Nickel Company of Canada, Limited. Established 1960.

*Wild of Canada Ltd. Prize in Engineering*

A prize of a set of stainless steel drawing instruments is awarded annually to a student in First year Engineering at Carleton University judged most worthy of the award by the Faculty of Engineering.

Donor: Wild of Canada Limited. Established 1960.

*Chartered Institute of Secretaries Prize*

A prize of \$25 annually has been made available to the University for proficiency in the study of Commercial Law. Established 1963.

Donor: The Chartered Institute of Secretaries, Ottawa Chapter.

*De Waan Foundation Prize on Arab Problems*

Each year for a period of five years from the first year of award, the De Waan Foundation offers a prize for work of appropriate scholarly level by an upper class student on the problems of Arab countries. Annual value, \$100. Students wishing to prepare for this award should first consult the Director of the School of Public Administration.

Donor: De Waan Foundation, 1960.

*V. A. Ewing Memorial Prize*

Value \$100. Awarded annually, if merited, on the recommendation of the Department of Biology to a student entering his graduating year in Honours Biology who has shown outstanding application and promise in his laboratory work in experimental and descriptive Biology.

Donor: Anonymous.

*Carswell Company Book Prize in Public Law*

Value \$30. Awarded annually to the student with the highest standing in a Public Law course.

Donor: The Carswell Company Limited. Established 1965.

*Prize in English as a Medium of Communication*

Value \$35. Awarded annually, on the recommendation of the Department of English, as a book prize to a student in English who intends to enter the teaching profession and who has shown interest and competence in the effective use of English as a medium of communication.

Donors: Mr. and Mrs. Herman S. Roodman. Established 1965.

#### *Wilfrid Eggleston Prize in Journalism*

Value \$150. Awarded to the undergraduate with the best record in the Second year Journalism degree program. This award is named in honour of Professor Emeritus Dr. Wilfrid Eggleston, former Director of the School of Journalism.  
Donor: Anonymous. Established 1967.

#### *Prize of the Ambassador of Switzerland to Canada*

For excellence in the study of French and German, book prizes are offered annually by the Ambassador of Switzerland to Canada. Established 1953.

#### *Prize of the Embassy of the Federal Republic of Germany*

For excellence in the study of German, book prizes are offered annually by the Embassy of the Federal Republic of Germany in Canada. Established 1955.

#### *Prize of the Embassy of Austria*

For excellence in the study of German, a book prize is offered annually by the Austrian Embassy in Canada. Established 1960.

#### *Spanish Embassy Prize*

For excellence in the study of Spanish, a book prize is offered annually by the Spanish Embassy in Canada. Established 1960.

#### *Prize of the Embassy of the Union of Soviet Socialist Republics*

For excellence in the study of Russian, prizes are offered annually by the Embassy of the Union of Soviet Socialist Republics. Established 1963.

#### *Prize of the Ambassador of the United States of America*

A book prize is offered annually by the American Ambassador to Canada to a graduating student who has distinguished himself in the fields of United States history, economics, or political science. Established 1968.

#### *Prize of the Government of Quebec for excellence in the study of French*

A book prize is offered annually by the Minister of Cultural Affairs of the Province of Quebec. Established 1968.

### **Bursaries**

Students who are eligible for Provincial Awards from the Province of Ontario or the Province of Quebec should first make application for these awards. Ontario secondary schools will supply applications for Ontario students entering university. In-course students should apply to the Awards Office. Completed forms should be sent to the Awards Officer, Carleton University.

Applications for student-aid grants from the Province of Quebec should be made direct to the Department of Education, Parliament Buildings, Quebec, before September 30.

Bursaries administered by Carleton University are awarded to students who have a sound academic standing, who show evidence of genuine financial need and who are not eligible to receive financial aid from the provinces of Ontario or Quebec.

One application only, available in the Awards Office, is required for bursaries which are administered by Carleton, and should be returned to the Awards Office by August 1.

Bursary recipients who withdraw before the completion of their year will be expected to refund their bursaries (or a portion thereof).

#### *University General Bursary Fund*

The fund is to provide bursaries in aid of students with satisfactory academic standing who, in the first or subsequent course-years, are in need of financial assistance. Established by the University in 1954.

#### *Graduate Bursary Fund*

The fund is to provide bursaries for graduate students with appropriate academic standing who are in need of financial assistance. Established by the University in 1958.

#### *Ontario Student Awards Program*

All students who are residents of Ontario and who satisfy the admission requirements of a Canadian university or an eligible post-secondary institution in Ontario may apply for an award under this program. To receive an award a student must establish a need for assistance and enrol in an eligible institution in a course other than Divinity in the year of award. An award under this program will be made to the extent of established need in a combination of a non-repayable grant and a Canada Student Loan. Application forms are available at post-secondary eligible institutions, and from the Awards Office at Carleton. Deadline date for applications is August 15 for replies prior to registration.

#### *Charles Ogilvy Ltd. Bursary Fund*

Value \$1000. To provide bursaries for students with good academic standing and who are in need of financial assistance.

Donor: Charles Ogilvy Ltd. Established 1960.

#### *ATA Trucking Industry Educational Foundation Bursary Fund*

Value \$1,200. To provide bursaries for First or Second year students who, due to extenuating circumstances, are deserving of financial assistance, and without such assistance would be unable to continue their studies.

Donor: Automotive Transport Association of Ontario (Inc.). Established 1959.

#### *Altrusa Club of Ottawa Bursary*

Value \$100. Awarded to a deserving woman student proceeding into the third or graduating year at Carleton University. Preference to be given to a student enrolled in Science or Journalism where other qualifications are equal.

Donor: The Altrusa Club of Ottawa. Established 1962.

#### *Ottawa Superfluity Shop Bursaries*

An annual sum of approximately \$180 is available to provide bursaries for veterans of World War I or World War II, or for the descendants of such veterans, who are students in good standing at Carleton University and in need of financial assistance. Endowed 1947.

#### *Ottawa Citizens' War Services Committee Bursary*

An annual sum of approximately \$60 is available to assist veterans, their dependents or descendants, who are students in good standing at Carleton University and are in need of financial assistance. Endowed 1948.

#### *Gyro Club Bursaries*

Two bursaries of \$250 each. Awarded annually to male students of promise who have completed at least one academic year at Carleton University, who have specific professional or vocational goals, and who, without financial assistance, could not continue their formal education.

Donor: Gyro Club of Ottawa. Established 1949.



*Wild of Canada Limited Bursary*

Value \$250. Awarded annually to a student majoring in Biology, with good academic standing and who is in need of financial assistance.

Donor: Wild of Canada Limited. Established 1961.

*C. A. Fitzsimmons and Company Limited Bursary*

Value \$150. Awarded annually to a competent student entering Carleton University who, without financial assistance, could not continue his or her formal education.

Donor: C. A. Fitzsimmons and Company Ltd., Ottawa. Established 1960.

*The Mary C. Grant Bursary (Laurentian Chapter, I.O.D.E.)*

Value \$500. Awarded annually to a particularly able student entering Carleton University or proceeding from one year of course to another, and requiring financial assistance to complete his or her studies.

The bursary has been established in honour of Mary C. Grant.

Donor: The Laurentian Chapter, I.O.D.E. Established 1962.

*J. P. Bickell Foundation Bursary Fund*

Value to be announced. The Trustees of the J. P. Bickell Foundation have established bursaries in the Faculty of Science. An applicant must be taking a normal sequence of courses leading to a degree in Geology and must have competent academic standing. Carleton students may obtain full details of the Bursary from the Awards Office.

Donor: J. P. Bickell Foundation, Toronto. Established 1956.

*Falkland Chapter (I.O.D.E.) Bursary*

Value \$100. Awarded to a deserving student from the Commonwealth progressing from one year of course to another in Carleton University.

Donor: Falkland Chapter, I.O.D.E. Established 1950.

*Knights of Pythias, Aurora Lodge No. 53 Bursary*

Value \$100. Awarded to a good student, progressing from one year of course to another, who needs financial assistance to continue his or her studies.

Donor: Knights of Pythias, Aurora Lodge No. 53. Established 1960.

*Atkinson Charitable Foundation Bursary Fund*

The sum of \$5,600 is available to assist students of Carleton University. Terms of award are as follows;

1. In addition to scholastic merit and financial need, goal and promise will be considered in selecting recipients.
2. Candidates must be residents of Ontario.
3. An applicant must have completed at least one academic year and be enrolled as a full-time undergraduate in any course at Carleton University.
4. For one of the awards, preference will be given to candidates intending later to pursue studies in Theology.

Donor: The Atkinson Charitable Foundation. Offered for the first time in 1951, as an experiment in the provision of financial aid to students.

*Maurice Frederick Carty Bursary*

Value \$300. Awarded annually to a student in course who would not otherwise be able to proceed without delay to a higher year within the University.

Donor: Mrs. E. G. Carty, in memory of her son, Maurice Frederick Carty. Established 1957.



*Edward Godfrey Carty Bursary*

Value \$300. Awarded annually to a student in course, specifically in Engineering, who would not otherwise be able to proceed without delay to a higher year within the University.

Donor: Mrs. E. G. Carty, in memory of her husband, Edward Godfrey Carty. Established 1964.

*Countess of Ashburnham Chapter (I.O.D.E.) Bursary*

Value \$100. Awarded annually to a student entering Carleton University, or already in course, who is in need of financial assistance to carry on full-time studies.

Donor: The Countess of Ashburnham Chapter I.O.D.E. Established 1959.

*R. A. Beamish Bursary*

Value approximately \$250. Awarded annually to a student entering or progressing from one academic year to another who, without financial assistance, could not continue his or her formal education. To be eligible, an applicant must be a resident of one of the eleven eastern counties of Ontario (Renfrew, Frontenac, Lanark, Leeds, Carleton, Grenville, Russell, Dundas, Prescott, Glengarry, Stormont).

Donor: The R. A. Beamish Foundation. Endowed 1951.

*South Ottawa Kiwanis Club Bursaries*

(1) Value \$250. Awarded annually to a student who has completed successfully at least one academic year at Carleton University and who, without financial assistance, could not continue university studies.

Donor: Kiwanis Club of South Ottawa. Established 1958.

(2) Value \$250. Awarded annually to a student who has completed successfully at least one academic year at Carleton University and who, without financial assistance, could not continue university studies. Restricted to students from Ottawa and from areas outside the Capital in Carleton and Russell Counties.

Donor: Kiwanis Club of South Ottawa. Established 1958.

*South Ottawa Kiwanis Club (Ladies Auxiliary) Bursary*

Value \$100. Awarded to a woman student who has completed one academic year at Carleton University, and who is in need of, and deserving of, assistance to continue studies as a full-time student.

Donor: Kiwanis Club of South Ottawa (Ladies Auxiliary). Established 1956.

*Lions Club of Ottawa (South) Inc. Bursaries*

Two bursaries valued at \$200 each. Awarded annually to a student of good character, who exhibits proficiency and promise, and who has completed one academic year at the University, and who, without the benefit of financial assistance, would be unable to continue his or her chosen studies.

Donor: Lions Club of Ottawa (South) Inc. Established 1957.

*James H. Ratray Memorial Bursaries*

Value \$200 each approximately. Three bursaries for students in Science and Engineering, with certain areas of preference. (Candidates are invited to inquire about these from the Awards Office).

Donor: The late James H. Ratray, M.C. Endowed 1961.

*Engineers' Wives Association Bursary*

Value \$400. Awarded annually to a deserving student enrolled in the Faculty of Engineering.

Donor: Engineers' Wives Association of Ottawa. Established 1959.

*Caro Murray Bursary (Earnscliffe Chapter) I.O.D.E.*

Value \$250. Awarded annually to students entering or progressing from one year of course to another at Carleton University, who have sound academic standing and are in need of financial assistance.

Donor: Earnscliffe Chapter I.O.D.E. Established 1962 in honour of Mrs. G. Scott Murray.

*Ottawa Poppy Welfare Fund University Award*

The Ottawa Poppy Welfare Committee offers an amount of \$1,500 to be used as awards to university entrance or to assist good students who are short of funds to continue in university. The amount of an award is \$300 to any one student but this amount may be modified depending on financial circumstances.

Application forms are available at Poppy Fund Headquarters, Trafalgar House, or the Awards Office, Carleton University.

Donor: The Ottawa Welfare Poppy Fund Committee. Established 1956.

*Philemon Wright Chapter (I.O.D.E.) Bursary*

Value \$75. Awarded annually to a student with satisfactory academic standing who is in need of financial assistance. Open only to residents of the Province of Quebec, with preference to those resident in the County of Hull and adjoining counties.

Donor: Philemon Wright Chapter, I.O.D.E. Established 1952.

*Thorne, Gunn, Helliwell and Christenson Bursary*

Value \$150. Awarded annually to a deserving student in Commerce in need of financial assistance.

Donor: Thorne, Gunn, Helliwell and Christenson. Established 1960.

*Phillips Bursary*

Value approximately \$200, the annual yield of a fund of \$5,000 made available to Carleton University by Miss L. A. Phillips. The bursary is to be awarded each year to a student with good academic standing who is in need of financial assistance. Endowed 1962.

*IBM-Thomas J. Watson Memorial Bursaries*

Value \$1,500 annually. To provide bursaries to undergraduates in any year of any faculty who are of good academic standing and in need of financial assistance.

Donor: International Business Machines Company Limited. Established 1963.

*Corporation House Limited Bursary*

Value \$250. To be awarded annually to a good student in need of financial assistance, who is, in addition, a son or daughter of a parent employed in the Civil Service of Canada, or in a Federal Corporation or Agency, or serving in the Armed Forces of Canada.

Donor: Corporation House Limited. Established 1962.

*Honourable Cairine Wilson Bursary*

Value \$200. Awarded annually to a good student entering Carleton University or proceeding from one year of course to another and requiring financial assistance to complete his or her studies. The bursary has been made possible by a bequest of the Honourable Cairine Wilson, first woman member of the Canadian Senate. Endowed 1962.

*M. Loeb Limited — IGA Bursaries*

Value \$2,500. To provide ten bursaries of \$250 each, to be awarded annually to good students either entering Carleton University or proceeding from one year of course to another who are in need of financial assistance.

Donor: M. Loeb Limited. Established 1962.

*Beta Sigma Phi Sorority Bursary*

Value \$250. Awarded to a deserving woman student entering Carleton University from an Ottawa Collegiate or High School. This bursary may be a continuing one for three years, provided the recipient maintains satisfactory academic standing.

Donor: The City Council of Beta Sigma Phi Sorority. Established 1964.

*Hydro-Electric Power Commission of Ontario Bursary*

Value \$500. Awarded annually to a student in need of financial assistance and who is entering the second year of the Honours course in Physics or Mathematics; or the second year of Engineering or Commerce.

Donor: The Hydro-Electric Power Commission of Ontario. Established 1964.

*Nathan Braham Bursary*

Value \$200-\$250. Awarded annually to an entering or returning student, with superior academic standing who is in need of financial assistance. The bursary has been made possible by a bequest of Mr. Nathan Braham. Endowed 1964.

*Steel Company of Canada Limited Bursary*

Value \$500 annually. Awarded to a good entering student who has completed his or her final year's work for university entrance in one school year. This bursary may be a continuing one for up to four years, provided that satisfactory academic standing is maintained.

Donor: The Steel Company of Canada, Limited. Established 1965.

*National Printers Limited Bursary*

Value \$250. Awarded annually to an undergraduate student who has completed at least one academic year at Carleton University, and who is in need of financial assistance.

Donor: National Printers Limited, Ottawa. Established 1965.

*Army, Navy and Air Force Veterans Ottawa Unit Bursaries*

Two bursaries valued at \$150 each. Awarded annually to students entering or progressing from one year of course to another in Carleton University, who have satisfactory academic standing and are in need of financial assistance. Preference will be given to veterans or the dependents of veterans.

Donor: Army, Navy and Air Force Veterans in Canada, Ottawa Unit 352. Established 1953 and 1964.

*Ormond M. Stitt Bursary Fund*

To provide bursaries for deserving students in need of financial assistance. The fund has been made possible by a bequest of the late Miss Edith May Stitt, in memory of her brother, Ormond M. Stitt. Endowed 1966.

*Friends of Carleton Bursary Fund*

A sum to provide bursaries for deserving students in need of financial assistance. This fund has been made possible by contributions from the Friends of Carleton University. Established 1967.

#### *Doran Bursary in Engineering*

Value \$500. Awarded annually to deserving students enrolled in the Faculty of Engineering, and progressing from second to third year. Preference will be given to students who plan a career in Civil Engineering.

Donor: Doran Construction Company Limited. Established 1967.

#### *Abraham and Mary Shaffer Bursary*

Value \$500. Awarded annually to a good student entering Carleton University or proceeding from one year of course to another, and requiring financial assistance to complete his or her studies.

Donor: The late Abraham Shaffer. Endowed 1967.

#### *Children of War Dead (Education Assistance) Act*

This act provides fees and monthly allowances for children of veterans whose deaths were attributable to military service. Enquiries should be directed to the nearest District Office of the Department of Veterans Affairs.

#### *Donald William Buchanan Bursary*

Value \$250. Awarded annually to a student entering or progressing from one academic year to another, and who is in need of, and deserving of, assistance to continue studies as a full-time student.

Donor: The late Donald William Buchanan. Endowed 1967.

#### *Litton Systems (Canada) Limited Bursaries*

Two bursaries valued at \$150. each. Awarded annually to students with good academic standing, enrolled in the Faculty of Engineering, and who are in need of financial assistance. Preference will be given to those students who plan to major in Electrical or Mechanical Engineering.

Donor: Litton Systems (Canada) Limited. Established 1967.

#### *J. Lansing Rudd Bursary*

Value \$225. Awarded annually to a good student progressing from one year of course to another who needs financial assistance to continue his or her studies.

Donor: The late J. Lansing Rudd. Endowed 1967.

#### *Gretta Boyd Memorial Bursary*

Value \$100. To be first awarded in 1969-70 to an undergraduate student in any year or faculty with good academic standing and in need of financial assistance.

Donor: Kiwanis Club of City View. Established 1969 in memory of the late Gretta Boyd (Mrs. David Boyd).

### **Loan Funds**

The university administers several loan funds which are available on a short and long term basis to students in need of financial aid.

Loans made from funds by the University are repayable after termination of undergraduate studies, and bear interest closely corresponding to the rate for Canada Student Loans beginning January 1 following the termination of studies. To be eligible for a loan, a student must have a satisfactory academic record and show need of financial assistance. Applicants for loans should contact the Awards Office.



#### *John W. Parker Loan Fund*

To assist students in need of, and deserving of, financial assistance, who appear willing and able to repay their loans. Undergraduates will normally be expected to have completed at least one year at Carleton University. Applicants must present a passing grade and show evidence in their academic record of likelihood of graduation. Under normal circumstances, the maximum loan to a student shall be \$500 a year, but loans up to \$1,500 a year to students with dependents may be made if merited.

Donor: The late Mrs. John W. Parker. Established 1955.

#### *Canada Student Loans Plan*

Students who do not qualify to seek assistance under the Ontario Student Awards Program may nevertheless apply for a Canada Student Loan provided that they meet certain conditions of eligibility. These are set out, together with other details of the Plan, in a brochure issued by the Government of Canada that may be obtained at all eligible post-secondary institutions and secondary schools in Ontario and from the Awards Office at Carleton. The application form for the Ontario Student Awards Program is also used for the Canada Student Loans Plan.

#### *Laurentian Chapter (I.O.D.E.) Small Loan Fund*

The sum of \$200 has been made available to assist in providing small emergency short-term loans to students in need.

Donor: Laurentian Chapter I.O.D.E. Established 1950; revised 1959.

#### *English-Speaking Union (Ottawa Branch) Small Loan Fund*

The sum of \$400 has been made available to assist in providing small emergency short-term loans to students in need. Preference is given to students from abroad who are enrolled as full-time students at Carleton University.

Donor: The English-Speaking Union (Ottawa Branch). Established 1962.

#### *Royal Commonwealth Society (Ottawa Branch) Small Loan Fund*

The sum of \$150 has been made available to assist in providing small emergency short-term loans to students in need. Preference is given to Commonwealth students from abroad who are enrolled as full-time students at Carleton University.

Donor: The Royal Commonwealth Society (Ottawa Branch). Established 1964.

*Further information regarding existing sources of scholarships, prizes, bursaries and loans may be had from the Awards Office.*





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## NOTES

## NOTES

## NOTES



1969

January							February							March						
S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S
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12	13	14	15	16	17	18	9	10	11	12	13	14	15	16	17	18	19	20	21	22
19	20	21	22	23	24	25	16	17	18	19	20	21	22	23	24	25	26	27	28	29
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27	28	29	30				25	26	27	28	29	30	31	29	30					
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January							February							March						
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25	26	27	28	29	30	31	29	30						27	28	29	30	31		

## **Registrar's Office Hours**

### *Labour Day to June 28*

Monday to Friday	9.00 a.m. to 12.15 p.m. 1.15 p.m. to 5.00 p.m.
Monday to Thursday	7.00 p.m. to 9.00 p.m.

### *July 1 to Labour Day*

Monday to Friday	8.30 a.m. to 12.00 noon 1.00 p.m. to 4.30 p.m.
Monday to Thursday	6.30 p.m. to 8.30 p.m.

## **Business Office Hours**

### *Labour Day to June 28*

Monday to Friday	9.00 a.m. to 5.00 p.m.
Monday to Thursday	7.00 p.m. to 9.00 p.m.

### *July 1 to Labour Day*

Monday to Friday	8.30 a.m. to 4.30 p.m.
Monday and Thursdays only	6.30 p.m. to 8.30 p.m.

## **Library Hours**

### *Summer Session*

#### *May-June*

Monday to Thursday	9.00 a.m. to 10.15 p.m. 10.15 p.m. to 11.15 p.m. Study Hall
Friday	9.00 a.m. to 5.00 p.m.
Saturday	9.00 a.m. to 12.30 p.m.

#### *July-August*

Monday to Thursday	8.30 a.m. to 10.15 p.m. 10.15 p.m. to 12.00 midnight Study Hall
Friday	8.30 a.m. to 4.30 p.m. 4.30 p.m. to 12.00 midnight Study Hall
Saturday	8.30 a.m. to 4.45 p.m. 4.45 p.m. to 12.00 midnight Study Hall
Sunday	1.00 p.m. to 12.00 midnight Study Hall

### *Winter Session*

Monday to Friday	8.30 a.m. to 10.15 p.m. 10.15 p.m. to 12.00 midnight. Study Hall
Saturday	9.45 a.m. to 4.45 p.m. 4.45 p.m. to 12.00 midnight. Study Hall
Sunday	10.00 a.m. to 12.00 midnight. Study Hall

When classes are not in session, hours vary and are posted at the entrance.

## **Bookstore Hours**

### *Labour Day to May (End of Final Examinations)*

Monday to Friday	9.00 a.m. to 4.45 p.m. 7.00 p.m. to 9.00 p.m.
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